This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

B 485718

1837
ARTES VERITAS SCIENTIA
LIBRARY OF THE
UNIVERSITY OF MICHIGAN
TUEBOR
SI QUAERIS PENINSULAM AMOENAM
CIRCUMSPICE

THE GIFT OF
H. S. Jewett

SCIENC

PAPILIO:

THE ORGAN OF THE
NEW YORK ENTOMOLOGICAL CLUB.

H S Jewett MD
– Dayton Ohio –

Devoted Exclusively to Lepidoptera.

VOLUME I.

EDITED BY
HENRY EDWARDS.

NEW YORK:
1881.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] January 15, 1881. [No. 1.

In issuing the first number of PAPILIO, as the organ of the "New York Entomological Club," it is the hope of its projectors that it will meet a want hitherto felt among students, and prove its claims to favorable consideration.

It will be devoted solely to Lepidoptera, the constitution of the Club being such that the other orders of insects may receive special investigation and publication, when the time arrives for more extended fields of labor.

PAPILIO will be issued about the fifteenth of each month (except during the two midsummer months), the subscription price being $2 per annum.

Most of the distinguished entomologists of the United States, among whom may be mentioned Dr. H. Hagen, Dr. Packard, S. H. Scudder, W. H. Edwards, Dr. H. Behr, R. H. Stretch, Prof. Lintner, etc., have approved the objects of the Club and promised their valuable assistance.

Subscriptions and communications should be addressed to Mr. HENRY EDWARDS, 185, East 116th Street, New York City.

A. R. GROTE,
HY. EDWARDS, } *Publication Committee.*
T. L. MEAD,

NEW YORK, January, 1881.

ON THE IMPORTANCE OF ENTOMOLOGICAL STUDIES.

From an address recently made to the Farmers' Club of Onondaga County, by Prof. J. A. LINTNER, State Entomologist of New York.

"Occasionally, at the present day, we may hear insects and entomologists spoken of as 'bugs' and 'bug-hunters'—epithets applied in derision to what are regarded as petty objects and trivial pursuits. Such views only betray an ignorance which is equally pitiable and inexcusable. The study of insects has assumed an importance in its direct application to agriculture, horticulture and sylviculture, second to no other department of natural history. It has called to its aid some of the best intellect of the country. Its literature has become extensive and assumed a high rank. Our State governments, in response to demands made upon them, are appointing State Entomologists. Our General Government is making liberal appropriations for entomological work in the Department of Agriculture at Washington, and also for sustaining a special United States Entomological Commission, now in the third year of its operations, charged with the investigation of a few of our more injurious insects.

"The study of insects assumes an importance in this country far greater than in any other part of the world. Nowhere else does mother earth yield in such variety and in such abundance her agricultural products; after supplying to repletion our own people, the excess is distributed to every quarter of the globe. Few, surprisingly few, of these varied products are native to our soil. Nearly all of our fruits, grasses, cereals and vegetables, and perhaps three-fourths of our weeds are of foreign importation—mainly from Europe. With their introduction, very many of the insects that preyed upon them were also introduced, or have been subsequently brought hither. But unfortunately for us, the parasites which preyed upon them and kept them under control, have, for the most part, been left behind. As the result, the imported pests, in their new home, find their favorite food-plants spread out in luxuriant growth over broad acres, where they may ply their destructive work without hinderance or molestation, until some native parasites acquire the habit of preying upon them.

"The grand scale upon which our crops are grown as no where else in the world—demanding for their gathering the invention of special mechanical contrivances, and that horse-power should be replaced by steam—has also as its attendant inevitable evil, an enormous increase of insect depredations. This may be illustrated by a reference to our apple-tree insects. * * * * * * "In like manner, any and every crop cultivated on a large scale offers strong invitation to insect attack, and wonderfully stimulates insect multiplication."

ON TWO NEW FORMS OF THE GENUS PARNASSIUS.

By Henry Edwards.

(*Read before the New York Entomol. Club, at the first meeting in December,* 1880.)

In my paper on Parnassius (Proc. Cal. Acad. Sc. 1878), I referred to a singular example sent to me from the Upper Yukon river, Alaska, which I then hesitated to describe, but which, by the advice of many entomologists, I now characterise as follows:

Parnassius Thor. Hy. Edw. n. sp.

Head, anterior portion of thorax above, and the whole of the lower side, base of the tibiæ, and under side of abdomen thickly clothed with bright golden yellow hairs. There are also a few scales of the same color at the base of the costa of the primaries and along the sides of the abdominal segments. Antennæ and tarsi jet black, the latter with some yellow hairs at their base.

Upper side: Ground color sordid white, as in *P. Clarius* Evers., and *P. Delphius* Evers.

Primaries with the posterior margins broadly smoky and slightly transparent. Above the margin is a row of equal lunate white marks, then a moderately broad blackish band, narrowing a little at the interior margin, then a whitish maculate band, broadest on the internal margin and reduced to a spot on the costa. Anterior to this is a sinuate row of white spots, six in number, not reaching the internal margin, which is whitish at the base, dotted with black atoms, as is also the costa. Base of the wing blackish, the cell with one large ovate, and one oblong white spot. The system of markings of the primaries recalls that of the genus Thais, and is different from any other Parnassius known to me.

Secondaries: Base and anal margin broadly black, the markings being very clearly cut around the upper portion of the cell, leaving a well-defined ovate white space. From the anal angle up to the second sub-costal nervure runs a wide black band, enclosing at the anal angle one small round and one lunate red spot. Between the second sub-costal and the discoidal nervures is an almost conical red patch, and below it a small round spot, also red. On the centre of the costa is a triangular red spot, surrounded with black. The submarginal lunules are very sharp and distinct, as indeed are all the markings, and the fringes of both wings are deep, intense black.

Under side: Resembling the upper, but the markings are a little fainter, and the wings have the glassy appearance so often found on the genus. The secondaries have four red spots at the base—the one on the costa small and almost linear, the second nearly square, the third triangular, and the fourth oblong. The other red spots have their centres white.

Expanse of wings, 2. 10 inch.

Type. Coll. Hy. Edwards.

This exquisite and very interesting insect was taken about 800 miles up the Yukon river, Alaska, by Mr. F. W. Smith, of San Francisco, and by him kindly added to my collection. In some respects it approaches closely to *P. Eversmanni* Men., but differs from the figure of that species given by Mr. W. H. Edwards, in the *Butterflies of North America*, not only in the color, which is remarkably distinct, but in the broader black base of the primaries, the wider bands, and the much larger proportion of black on both wings. The red spots, too, are more numerous, those of the anal angle and the base of the costa of secondaries being wanting in Mr. Edwards' figure. As the present form, however, comes from nearly the same locality as the type from which that figure is taken, it may ultimately prove to be an extreme variety of *P. Eversmanni.* It is, however, so distinct to be considered for the present as a separate species.

PARNASSIUS HERMODUR. n. var.

♀ A remarkable variety of *P. Smintheus* Dbly., which approaches very closely *P. Corybas,* Fisch, from the Altai. The whole upper surface of the primaries is of a smoky black hue, slightly transparent, the usual bands being lost in the ground color of the wing. In this respect it nearly resembles *P. Corybas,* but the latter, as well as two red spots near the costa, has also another near the internal margin, which is absent in the present form. The red spots of secondaries are nearly the same in both, but in *P. Hermodur* there is a trace of some red scales near the anal angle, which is wanting in *P. Corybas.* The black sub-marginal lunules of secondaries are also much more strongly marked in *P. Corybas* than in *P. Hermodur,* and the wing is whiter and more opaque. On the other side the resemblance is more apparent, the red spots on the costa, and that between the sub-costal nervures having white centres in both forms, while those of the base are wholly red, and alike in their color and arrangement. The present insect is smaller than its ally, the expanse being only 2.30 inch, while the pair of *P. Corybas* in my collection measure 2.65 inch.

Southern Colorado.

Type. Coll. Hy. Edwards.

This extremely interesting insect was generously given to me by my friend, Dr. James S. Bailey, of Albany. I have named it after the son of Odin and Freija, and the Mercury of the Scandinavian mythology.

DESCRIPTION OF FOUR NEW SPECIES OF MOTHS.

BY A. R. GROTE.

(*Read before the N. Y. Ent. Club, at the first meeting in December,* 1880.)

SCEPSIS EDWARDSII. n. sp.

This form is stouter than *fulvicollis,* with paler forewings and approaches *Echeta albipennis,* H.-S. from Cuba.

Forewings pale, slaty brown, with a whitish cast; the costal edge pale yellow, which shade extends faintly within the edge, from the middle outwardly, and obtains beneath, over apical third of costa.

Secondaries hyaline with broad smoky costal border, and narrow smoky external edging.

Beneath, primaries bluish black; secondaries hyaline with bluish costal border.

Head behind, palpi, base of fore legs orange. Thorax, pale, slaty brown; collar touched with orange; abdomen metallic blue above, white beneath; legs white inwardly. *Expanse* 38 mm.

Indian River, Fla. Collection of Mr. Hy. Edwards, after whom this interesting species is named.

PARASA FRATERNA, n. sp.

This differs from *chloris*, which is evidently Reakirt's *viridus*, by the absence of the brown dark spot on the terminal brown marginal band of primaries, and by the greater width of that band, and the narrowness of the green median band. Else the species are very similar, but the difference is striking in comparison. *Fraterna* is slighter than its ally, and the larva, found by Mr. Tepper, is quite distinct from that of *chloris*, as I am informed by Mr. Tepper. Thorax and vertex green; hindwings yellowish at base, with darker border; fore wings with an inwardly oblique median green band, not extending over costal edge, and reaching to the base of the wing along internal margin. N. Y., Mass., Mr. Roland Thaxter; also in Mr. Tepper's collection.

MAMESTRA SUTRINA, n. sp.

This species is similarly sized with the Californian *cuneata*, but a little slighter-bodied. It is deep brown, cut and lined with white and wants all yellowish markings, and is thus differently colored from its ally. It differs in markings by the absence of the dots following the t. p. line, and by the white lunulate s. t. line. Lines double, filled in with white. Reniform and orbicular subequal, approximate, white-ringed. Claviform outlined in black, beyond it a white spot. A dark line upon submedian fold. Median lines lunulate, uneven, approaching inferiorly. Black interspaceal marks precede the white s. t. line. Half-line marked; t. a. line nearly perpendicular, marked by a black outer line and preceding white shade; t. p. line outwardly bent above, drawn in below vein 4, well removed outwardly. Beneath fuscous; hind wings irrorate with whitish, with discal dot and transverse line; above, secondaries with darker border and slightly paler base. Eyes hairy; body tufted. *Expanse* ♂ 30 mm. Colorado.

CATACOLA DULCIOLA, n. sp.

A new species of Catocala (I do not now think we have to do with a variety), has been collected by my friend, G. R. Pilate, of Dayton, Ohio, in his neighborhood. It is of the size of *crataegi* and has its paler color; it is pale greenish gray, the primaries with a slight reflection recalling, *praeclara*. It is intermediate between *alabamae* and *crataegi*. It differs by the anterior line, forming a moderate arc, being more even and without the usual indentation on vein 1. The lines are black, the t. p. line fine. The veins are marked with black over the terminal space. The median shade is indicated by a dentate black costal mark, a black basal dash. The basal space is darker than the rest of the wing, while the depth of the terminal coloring leaves the large median space of the primaries pale and contrasting, reminding us a little of *C. cordelia*. The hind wings are dark yellow, with the wide black median band connected with the base, and resemble those of *polygama*. Five or six examples, all alike, have been collected by Mr. Pilate, of this interesting form, which I call *C. dulciola*. The female type before me expands 44 millimetres.

ON THE EARLY STAGES OF SOME MOTHS.

By D. W. Coquillett, Woodstock, Ill.

The larvæ described below are provided with 16 legs, except the last one, which has only 12:

Apatela americana, Harris.—Body greenish white; a subdorsal and stigmatal black line; on top of the last two segments is a black stripe which widens posteriorly; body thickly covered with short pale yellow hairs; on top of segments 4 and 6 are two pencils, and on top of segment 11 is a single pencil, of very long black hairs; venter black; head shining black; length 2½ inches. One specimen taken on a red-oak tree August 13; on the 19th of the same month it spun in one of the upper corners of its breeding cage a large cocoon, interwoven with the hairs with which its body was covered; the imago emerged on the 24th of May of the following year.

Apatela lobeliæ, Guenée.—Body bluish gray, the dorsal space tinged with yellow; a dorsal and subdorsal pale yellowish line extending only to segment 11 which is humped, the top blueish, and on it are four quite large piliferous spots, top of segment 4 bluish, interrupting the dorsal line; piliferous spots whitish, prominent, each bearing a black hair; sides of the body quite thickly covered with whitish hairs; spiracles white, encircled with black; venter, greenish white; head, gray, dotted with black, and marked on the top with two blood-red spots; length 1½ inches. One specimen found June 6, on a burr oak tree; it spun a cocoon June 22, disclosing the imago July 14.

Apatela falcula, Grote.—Body, dark brown, mottled with pale greenish; a dark dorsal line, on each side of which are two rows of prickles, most distinct on anterior part of body; the four prickles on top of segment 11 are larger and placed closer together than those on the segments anterior to it; from each of these prickles proceeds or two short black hairs; venter, greenish white; sides of head pale greenish, the face brownish; length, 1¼ inches. One specimen found on hazel, September 25, entered the earth and spun a thin cocoon September 29, disclosing the imago May 25 of the following year.

Apatela superans, Guenée.—Body green; a reddish brown dorsal stripe, edged with yellow; in the middle of this

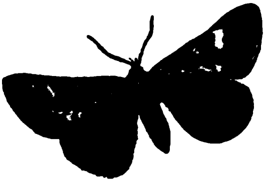
Edwardson & Hilleros, Newcastle.

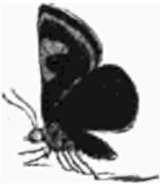
[illegible] leaves [illegible] contrasting [illegible] with [illegible] have [illegible] which I [illegible]

[illegible]

[illegible] with [illegible] on the top with [illegible] June 22 [illegible] with [illegible] dorsal [illegible]

[illegible]





Edwardsia Brillians, NEUMOEGEN.

stripe is a light line on each side of which is a zigzag row of small prickles from each of which issues one or two black or whitish hairs; on each side of the body are a a few small prickles from each of which issues a thin cluster of whitish hairs; a whitish stigmatal line; segment 11 slightly humped; head large, the sides pale green, the face reddish brown, sometimes tinged with pink; length 1¼ inches. One specimen was found upon a plum-tree, July 26; it entered the earth and spun a tough cocoon, August 8, producing the imago, May 12, of the following year. Another specimen was found upon a cherry-tree; it assumed the chrysalis form, August 31, disclosing the imago, May 25, of the following year.

ARCTIA VIRGUNCULA, Kirby.—Body black; hair in spreading clusters from black warts; the hair in the region of the spiracles is reddish brown, the rest black; head shining black; length 1½ inches. Feeds on knot grass (*Polygonum aviculare*). One specimen found April 28, spun a thin cocoon June 10, disclosing the imago June 27.

CATOCALA FRATERCULA, Grote and Robinson.—Body ashen gray, the dorsal space dark gray, and on its outer edge is a row of black pilferous spots; on top of segment 8 is a conical dark gray projection, tipped with whitish; posterior part of segment 8 blackish; venter pale greenish white with a row of black spots in the middle, one spot to each segment; the two anterior pairs of abdominal legs are much smaller than the two posterior pairs; head light gray, bordered on the top and sides with black; length 1¾ inches. One specimen found on a burr oak tree, spun its cocoon June 1, disclosing the imago June 28.

CATOCALA AMICA, Hübner.—Body slender, dull greenish yellow, a light dorsal stripe, on each side of which is a darker stripe on which is a row of black piliferous spots; a stigmatal row of black piliferous spots; on top of segment 8 is a slight prominence; venter greenish white, with a row of black spots in the middle, one spot to each segment; the two anterior pairs of abdominal legs are smaller than the two posterior pairs; head gray, with two white spots on upper part of face; length 1¼ inches. Found two specimens on a burr oak tree, June 5; they spun cocoons about July 3, disclosing the imagoes July 24.

MAMESTRA TRIFOLII, Rott.—Body green; a dark dorsal line; a white stigmatal line; piliferous spots not visible; venter green, unmarked, head pale green; length nearly 1 inch. One specimen found upon *Chenopodium album*, July 5, entered the earth the next day, disclosing the imago July 23.

EUSTROTIA CARNEOLA, Guenée.—Body green, usually very dark, the subdorsal space sometimes tinged with blackish; a white dorsal line sometimes edged with black; a white subdorsal and stigmatal line; a row of white dots on dorsal and subdorsal spaces; venter green, unmarked; head green; length ¾ inch. Feeds on yellow dock. A dozen or so of these larvæ issued from eggs June 2; they spun thin cocoons beneath chips, etc., from June 18, to 21, producing the imagoes, July 4 to 7.

PYRRHIA ANGULATA, Grote.—Body bluish white; a yellowish brown stigmatal stripe; from the stigmatal stripe on one side of the body to that on the other side are about 10 black lines; sometimes a dorsal row of about 7 yellowish brown spots; piliferous spots, black; venter pale greenish; head shining yellow, with a black dot on each side near the jaws, the jaws sometimes black; length, 1½ inches. Several specimens found upon smartweed (*Polygonum Pennsylvanicum*), September 15; they entered the earth about three inches and formed oval cells, September 27, disclosing the imagoes May 22, and a few days afterward.

TARACHE ERASTRIOIDES, Guenée.—Body deep green; a white stigmatal stripe; body marked with 16 or 18 wavy black or white lines, or with 12 white lines; venter green, marked with 7 or 8 white lines; head green, striped with white, or marked with black and white; length, 1 inch. Several specimens found on ragweed (*Ambrosia artemisifolia*), July 11; they entered the earth (date not known), disclosing the imagoes about May 22 of the following year.

"NORTH-AMERICAN TORTRICIDÆ."

By Lord Walsingham, London, 1879.

This work, in quarto, with 17 colored plates, forms Part IV. of the "Illustrations of typical specimens of Lepidoptera Heterocera in the collection of the British Museum," and "deals exclusively with the North American Tortricidæ in the National collection."

The value of Lord Walsingham's work can be best appreciated by the specialist, and when we consider that it completes the work of Robinson and Fernald in identifying Mr. Walker's types in that group, we should be willing to consider its value great. But it goes further than this, and gives a fair illustration of our Western Tortricidæ from material collected by the author in California and Oregon. In addition, a list is given of all the species which are common to Europe and North America. These latter are forty-eight in number, a seemingly large percentage of the species known. Thanks to the labors of Robinson, Zeller, Fernald, and Walsingham (I name them in the order of priority), our North American Tortricidæ are becoming better known and classified, so that they are being brought into correspondence with the European catalogues. This has been my aim with the

Noctuidæ, although in this larger group I can hardly hope to accomplish what Lord Walsingham has completed in the Tortricidæ, namely, the finding out what all Mr. Walker's descriptions really covered. With every assistance it has been a difficult task for Lord Walsingham, and in cases where more than one species has been included by Mr. Walker under the same name, perhaps the last word has not been said. In any event, while it must be acknowledged that, aside from the question of synonymy, Mr. Walker's work was not worth preserving, it must be conceded that Lord Walsingham's setting has given it a permanent value, and that so far as the North American Tortrices are concerned, the question what we are to do with Mr. Walker's descriptions has been satisfactorily answered.

With regard to the new material figured and described there is much of interest. The remarkable new form, *Synnoma lynosyrana*, with its unusually dissimilar sexes is a case in point. The new species of *Cenopis*, then *Lophoderus triferana*, *Paedisca crambitana* and *Proteopteryx emarginana* are all strange and interesting forms. In describing *Lozotaenia retana*, however, Lord Walsingham has renamed *houstonana*, and his *Cenopis gracilana* is a synonym of *sulfureana*.

The lithographic plates are good without being excellent. The drawing is a little stiff, but the coloring has been carefully done. The plates are, on the whole, perhaps, better than Robinson's, while they want the enlarged detail of Zeller's illustrations. But as they are in the same style as Robinson's, they are best compared with these, and they add much to the value of a work one of the main purposes of which is a ready identification of the species it discusses.

A. R. GROTE.

ON A NEW SPECIES OF ARCTIA FROM FLORIDA.

BY B. NEUMOEGEN.

ARCTIA FLAMMEA. n. sp.

Head, antennæ, palpi, eyes, patagiæ and thorax of dark black color; antennæ serrated and moderate; palpi hairy; abdomen black; above with a broad, double dorsal line of brilliantly red color, segmentarily serrated; beneath dark black, with slight indications of a dotted red lateral line; legs black; anterior coxæ reddish below.

Primaries deep velvety black, a little pointed towards apex, with concolorous fringes; markings of cream color, intermixed with light red, as follows: two longitudinal lines of irregularly shaped, square dots, starting from sub-costal nervure, the interior one following straight to median nervure; thence, somewhat diverted from its course, down to inner angle of interior margin, looking like a straight line bent in the middle, and dividing the space between costa and exterior margin, into an irregular, triangular field. The anterior line of dots, starting near apex, not parallel to interior line, but diverting from its course and striking the exterior margin at conjunction of second discoidal nervule. These two longitudinal lines are connected by a horizontal bar of very narrow, irregular dots, following the course of second discoidal nervule. The connecting dot of horizontal and anterior longitudinal lines, near exterior margin, is of furcate shape, and the whole appearance of the shorter anterior and longer interior lines, intercepted by the vertical bar, strikingly resembles the figure 4. An irregular cream colored spot in discal area.

Secondaries intensely red, with black fringes, and broad, black marginal band from base to somewhat beyond anal angle. A large black reniform spot, starting from costa rests on median nervule. A small longitudinal line of irregular black spots from costa, near apex, reaches to second sub-costal nervule, without touching the marginal band, and leaves a small interspace of red. Resting on marginal band, near anal angle, are two irregular, triangular shaped black spots, connected above by a small black line, thus forming a small square space of red color.

Beneath the markings on primaries and secondaries are the same, with the exception that those on former are of a light rose, instead of cream color.

Expanse of wings, 1.75 inches.

Length of body, 0.75 inch.

The insect is readily distinguishable from the other members of its group by the striking contrast of the dark black primaries and thorax, the flaming red color of its secondaries and upper part of abdomen, and the sparse disposition of the markings and lines, usually so abundant in North American Arctians.

Habitat: Indian River, Florida. Collected by Dr. Wissfeld, season of 1880.

Type, ♀; coll., B. Neumoegen.

NEW YORK, December 24th, 1880.

THE NORTH AMERICAN SPECIES OF EUSTROTIA.

BY A. R. GROTE.

(*Read before the N. Y. Ent. Club, at the first meeting in December.*)

The species of *Eustrotia* differ from *Thalpochares*, among other characters, by the presence of an accessory cell on the primaries. Lederer divides the species in two groups according as the abdomen is provided with tufts over the dorsal region or not. In A the abdomen is untufted; in B tufted. The European catalogues give us ten species. I refer the following fifteen species from North America to the genus, for which latter I retain the Hübnerian term *Eustrotia*, for the reason that *Erastria* had been employed for a genus of Geometridæ by Hübner before it came to be used for the present group by the Viennese Entomologists. The synonymy of our species is not much embroiled. I have not been able to examine all of them as carefully as I wish, for of some I have only single examples which I cannot denude. I entertain but little doubt, however, that they are all correctly referred to this genus. Mr. Morrison has described *E. mariæ* as *Hadena norma* and again as *Lithacodia penita*.

GROUP A.

Malaca *Grote*, Trans, Am. Ent. Soc. 4; 96 (*Erastria*).
Mitographa *Grote*, Trans. Am. Ent. Soc. 4, 96 (*Erastria*).
Albidula *Guen*., Noct. 2, 230 (*Erastria*).
Secta *Grote*, Can. Ent., 11, 199; id., 12, 50.

GROUP B.

Concinnimacula *Guen*., Noct. 2,238, Pl. 10, fig. 10 (*Leptosia*); Grote, Check List (*Eustrotia*). *var.* parvimacula *Grote*, N. Am. Ent. 1, 66.
Synochitis *G. & R*., Trans. Am. Ent. Soc. 1, 357 (*Erastria*); Grote Bull. B. S. N. S., 2, 37 (*Eustrotia*).
Musta *G. & R*. Trans. Am. Ent. Soc. 4, 358 (*Erastria*); Grote Bull. B. S. N. S. 2, 37 (*Eustrotia*).
Muscosula *Guen*., Noct. 2, 230 (*Erastria*); Grote, Bull. B. S. N. S. 2, 37 (*Eustrotia*).
Carneola *Guen*., Noct. 2, 228 (*Erastria*); Grote, Bull. B. S. N. S. 2, 37 (*Eustrotia*); *biplaga* Walk., Noct. 809.
Apicosa *Haw*. Steph. Haust. 3, 119 (*Erastria*); Grote Bull. B. S. N. S. 2, 199 (*Eustrotia*); Wood Index 74, Pl. 17, fig. 464; *Erastria nigritula* Guen., Noct. 2, 229, Pl. 10, fig. 7; *Miana undulifera* Walk., Noct. 258.
Retis *Grote*, Can. Ent. 11, 198.
Caduca *Grote*, Can, Ent. 8, 207.
Mariæ *Grote*, Can. Ent. 9, 67.
Aeria *Grote*, n. sp.
Dividua *Grote*, N. Am. Ent. 1, 46.

EUSTROTIA AERIA n. sp.

This species is about the size of *dividua* with the colors of *apicosa*. Head and collar black. Fore wings pale ochry or rusty fuscous. The lines and spots are not obvious. The costa at base is marked with black. The median shade line is black and is broadly black on the costal region. A large sub-quadrate black patch on costal region between the t. p. and s. t. lines. An oblique apical black mark. Hind wings pale fuscous, beneath still paler with indistinct discal spot and double lines. One specimen, Racine. Wisc., Dr. Hoy.

DESCRIPTIONS OF TWO NEW SPECIES OF LITHOSIDÆ.

By Henry Edwards.

NOLA ANFRACTA. n. sp.

Ground color of primaries, olive brown, with white shades. Basal space olivaceous—t. a. line broad slightly sinuate, whitish, shaded with greyish on the edges, enclosing a darker line in its centre. Median space also olivaceous, darkest in the centre of the wing. T. p. line shaded as the anterior line, and also enclosing a dark line in its centre. The t. p. line runs obliquely from the interior margin, nearly to the apex, where it turns very suddenly upwards, and reaches the costa about the middle. It is brownish at its costal end, and rests on a white blotch. There are also four other triangular white blotches between its termination and the apex. The margin is broadly silvery white, and between it and the t. p. line is a pale olivaceous space. Apex with a small brown dot, and there are six others at the termination of the nervules. Secondaries, smoky white, with a faint discal spot, and the ends of the nervules brown. Under side, smoky white, with a faint discal spot darkest on costa of primaries, where are faint indications of two broken bands. The secondaries are the same as on the upper side. Head, palpi, thorax, tibiæ and tarsi slightly dusky.

Expanse of wings, 0.80 inch.

1 ♂. Yosemite Valley, California.

Type. Coll. Hy. Edwards.

CROCOTA OSTENTA. n. sp.

Head and thorax, fawn color, with an orange tint—the latter with the collar and patagia narrowly red. Palpi, tarsi, tibiæ, and under side of abdomen fawn color. Abdomen above, black, with red lateral streak. Eyes large, black. Primaries, wholly dull orange, paler and brighter on the costa. Secondaries with their costal half bright crimson, the other half velvety black, widest at the anal angle. Under side—primaries bright crimson, same color as the costal half of secondaries. Secondaries the same as in the upper side.

Expanse of wings, 1.35 inch.

1 ♂. Prescott, Arizona. W. Howard.

The most showy and remarkable species of the genus.

THE ILLUSTRATION OF EDWARDSIA BRILLIANS.

The beautiful insect represented in the colored plate is Edwardsia brillians, Neum. It was described in the *Can. Entomologist*, April, 1880, from a specimen captured in N. W. Texas, by the late Jacob Boll. The type is in the collection of Mr. B. Neumoegen.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] February 19, 1881. [No. 2.

A NEW INSECT INJURIOUS TO THE HICKORY.

By A. R. Grote.

In my paper on Pyralidæ, published by the United States Geological Survey, I called attention to the injuries caused by several species of the *Phycidae* to our forest trees. Our pines are attacked by species of the genus *Pinipestis*; the history of *P. Zimmermani*, which attacks also imported pines and should be noticed by Nurserymen, has been somewhat fully worked out. The following species are found to attack our hickories (*Carya*).

ACROBASIS CARYAE, n. s.

♂ The maxillary palpi untufted, the antennæ ciliate, with a sub-basal flexure and a scale-tooth on the thickly scaled basal joint. Shining grayish fuscous; the head and thorax concolorous. Smaller than *Angusella*, without the carneous shadings and reddish thorax and head. Outer line of primaries pale, narrow and faint. Inner line a ridge of raised darker scales narrowly edged outwardly by a pale, flesh-colored shade. The wing is paler, more grayish, at base. The color shifts with the light. Discal points faint. In ornamentation this species is inconspicuous. Hind wings as usual blackish; fringes interlined, concolorous. Length of primary wing, 9 mil. Reared by Mr. Coquillett from larvæ on *Carya Porcina;* the larvæ has been found "boring into the twigs."

Mr. Coquillett describes the larva and chrysalis as follows:

ACROBASIS CARYAE, *Grote*.

Body subcylindrical, smooth, pale greenish ash; a pale brown subdorsal dot on each side of segment 2; a wavy-fold below the spiracles; the latter are encircled with a dark brown ring, and there is a brown piliferous dot above each; a few whitish hairs on each side of the body; top of segment 1 polished, yellowish green; head narrower than segment 1, heart shaped, dark brown; venter pale green, unmarked; 16 legs; length, 14 mm. Found

May 21, burrowing in the branches of the Pignut Hickory (*Carya Porcina*) usually selecting the lower branches; imagoes about June 22. *Chrysalis.*—Of the usual form, pale brown, rounded at the posterior end, at which place there is a cluster of about 4 slender hooked spines; length, from 7 to 8 mm. The larva spins a thin web around the footstalks of the leaves which grow near the terminal end of the branch, and then burrows into the terminal bud and the wood of the present year's growth. It webs its castings together and forms a short tûbe which projects outward from the mouth of its burrow, and is closed at the outer end. The larva probably assumes the chrysalis form in its burrow, but those which I reared deserted their burrows and spun tough cocoons beneath the litter in the bottom of the breeding-cage. These larvae are very subject to the attacks of parasites; from a small number which I collected I obtained three moths and two Hymenopterous parasites which Mr. E. T. Cresson determined to be the *Phanerotoma Tibialis* of Haldeman. One of these parasites issued June 21 and the other June 26.

ACROBASIS ANGUSELLA, Grote, N. Am. Ent. 1, 51,

This species has a continuous black dash on the *underside* of the secondaries along costa. The thorax and base of forewings are dirty reddish. The transverse anterior line is curved; the posterior line is denticulate. The lines are oblique and uneven. In *A. Caryæ* they are perpendicular. *Acrobasis Angusella* has been reared by Mr. Akhurst from larvæ boring into the leaf stems of the hickory. The dash is less vivid in the following:

ACROBASIS DEMOTELLA, n. s.

♂ This species has a shorter black mark on secondaries beneath, not connected with the base of the wing, and a narrow basal streak along median vein. Forewing fuscous; base pale, stained with reddish, with an ashen shade on internal margin in place of the usual scale ridge. Outer line obliterate, pale, sinuate, not dentate as in *Angusella*, followed by a vague, reddish shade. Head and thorax whitish with a faint reddish tinge. Hind wings pale fuscous with paler fringes. *Expanse*, 24 mil. West Farms, Mr. Angus. This differs, as above noted, from *Angusella*, as a variety of which I considered it in my original description of that species. It must be considered distinct since *Angusella* has been reared by Mr. Akhurst, whose specimens agree with my type. The head and thorax are nearly white in *Demotella*. the larger and brighter of the two forms; the peculiar black dash on hind wings is not so bright and does not continue along costa to base. The habit of the larvæ of *Demotella* is unknown to me. In the *Phycidæ* it is necessary to have the male in order to correctly refer the species. No descriptions should be made from the female alone.

ON THE LARVÆ OF TWO NOCTUIDS.

By L. W. Goodell, Amherst, Mass.

CHARADRA PROPINQUILINEA, Grote.—Mature larva, one specimen; head round, slightly flattened in front, brown, smooth and glassy. Body thickest near the middle, tapering to each end, of a dirty white, with a large black spiracular spot on all the segments except the last two. It is covered with spreading tufts of short, stiff, white hairs, several of the hairs on the last two segments long and slender, extending over the end of the body. On each of the 4th and 11th segments situated close together, one behind the other, are two short pencils of light yellowish red hairs, and on the same segments, just below the hinder pencils, is another longer pencil of the same color. All the segments are thickest through the middle. My notes fail to give the length. Feeds on white birch, living in a sort of case made by folding a leaf or drawing two leaves together, and attaching them by their edges with silken threads. It changed to a pupa within its case September 20, and the imago emerged June 6.

MAMESTRA ASSIMILIS, Morr. Mature larva, one specimen. Head as wide as the first segment of the body; roundish, reddish horn color. Body smooth, thickest in the middle, tapering slightly to each end; dorsal space reddish brown, shading to dull red on the subdorsal; yellowish green beneath. There is a broad, straight, bright yellow dorsal stripe, with a narrow creamy white stripe adjoining it on each side; another narrower bright yellow spiracular stripe, with a creamy stripe adjoining it above and below, the latter edged outwardly with black. Length when at rest 27 mil.; when crawling 33 mil. Feeds on Golden Rod (Solidago). Pupated in the earth September 30, and the moth emerged May 29.

NEW PYRALIDÆ.

By A. R. Grote.

CATACLYSTA MEDICINALIS, n. s.

The smallest species yet known to me, with different ornamentation from the *Fulicalis* group. Brown, ochery and white. A broad, inwardly oblique, silvery white sub-basal band continuing over hind wings. A white median patch followed by a curved white line. A white outwardly oblique band at apical third, nearly meeting a white band along external margin, stopping at the middle of the wing; an ochre shade between the median patch and the oblique costal band; external margin from apices downward margined by an ochre band, narrowly divided by a brown line of the color of the wing from the white exterior band; the brown basal patch includes an ochre shade spot; the markings are continuous over hind wings at base; the large white subterminal field is sprinkled with brown scales; the terminal band is velvety black enclosing four or five gilt points; the edge of the wing is ochery, obtaining at apices; black scales extend from the terminal band beyond the gilt points, interrupting the ochre edging of the wing; beneath with the markings more faintly repeated; tegulæ striped with white. Expanse 12 mil., Carbondale, Illinois, Prof. French, in July. Smaller than Lederer's *opulentalis*, with very different secondaries. The ocelli are present.

CATACLYSTA HELOPALIS, *Clemens*, P. A. N. S. Phil., 217, 1860.

I have identified this species from specimens (N. Y.) in my collection. As stated by Clemens it differs from *C. Fulicalis* in having ocelli. In ornamentation and general appearance it is very like that species. It is a little larger, paler, with narrower inner line on secondaries, and there are a few obscure metallic points on the lower half of the external border on primaries. With this the small form *C. Medicinalis* agrees in having ocelli; but I can refer neither to the allied genera having ocelli. I have examined *C. Fulicalis* Clem., *C. Angulatalis* Led. (?) and *C. Bifascialis* Rob., in my collection, in all of which the ocelli are absent. These species may be arranged as follows. The neuration appears to differ in all the species.

CATACLYSTA, Hubner.

GROUP A, with ocelli, *Chrysendeton* m.
Medicinalis *Gr.* n. s.
Helopalis *Clem.*, Proc. A. N. S. Phil., 217, 1860.

GROUP B, without ocelli, *Cataclysta* Hub.
Fulicalis *Clem.*, Proc. A. N. S. Phil., 216, 1860.
Angulatalis *Led.*, Kaden in lit., 486, No. 132.
Bifascialis *Robinson*, Ann., N. Y. Lyc. N. H. Vol. ix. 154, Pl. 1, fig. 4.

I have not yet met with specimens of *C. Opulentalis* Led. Taf. 18, fig. 7 (which cannot be *Fulicalis*) or *Moniligeralis* Led., Taf. 18, fig 10. It is also not known to me under what names our species stand in the British Museum collection. The genera *Dicymolomia* (*Decora* Zell., from Texas, and either the same or an allied form from California) and *Chalcoela* (*Aurifera* Zell., and *Robinsonii* Gr.) belonging to our fauna, have also gilded dots on external margin of secondaries, but are structurally quite distinct from *Cataclysta*.

The following three described species of *Hydrocampa* are in my collection; the ocelli are present in all three forms.

GENUINALIS *Led.*, Taf. 18, fig. 2; *genuialis* Led. 483, No. 123.

PACALIS *Grote*, n. s.

EKTHLIPSIS *Grote*, Can. Ent, 8, 111.

DESIDERATUM.

? FORMOSALIS *Clem.*, P. A. N. S, Phil., 217, 1860.

·HYDROCAMPA PACALIS, n. s.

Ocelli present. Fore wings pale ochre shaded with fuscous. A pale ochre costal median patch edged by the brown irregular and fragmentary median lines, and extending over the cell. A white brown ringed spot on submedian space. The outward median line forms an inward arcuation below costa and is interruptedly edged with white. The wide subterminal field shaded with fuscous. A brown line before the margin runs downward and then runs inwardly around anal angle. It is irregularly preceded by white shade spots, and is succeeded by a white brown-ringed spot on internal margin. The markings are repeated on hind wings where the brown lines enclosing the white median space are continuous, the outer line forming a superior extension and the white shading before the subterminal line is prominent and subcontinuous, not cut into spots as on primaries. Head and thorax dull ochre. Beneath, the markings more faintly repeated. *Expanse* 21 mil. N. Y. Less distinctly marked and quite different from *H. ekthlipsis*. Differing from *genuinalis* by the fuscous sprinkling of scales, the less distinct median lines, the straighter subterminal line of primaries with its obsolete white anterior shading, and the following white spot before anal angle.

PARAPONYX PLENILINEALIS, n. s.

♂ Ocelli. Maxillary palpi porrect. Male antennæ with the joints rather long and with a whorl of scales at the end of each joint. The antennæ clothed with sparse decumbent scales. White; forelegs blackish inwardly. Both palpi whitish; second joint of labial palpi fuscous outwardly. Thorax white, marked with black and fuscous scales on the shoulders; on the tegulæ behind and on the dorsum of the thorax in front. Forewings white, sprinkled with brown scales on the cell, evenly banded with yellowish and fuscous. Discal spot, a narrow black ringlet. Fringes outwardly gray; white at base, with a distinct series of black elongate, squarish spots, the fragments of a line, continued on hind wings. Outer edge of the wing yellowish fuscous, preceded by a narrow white line, and this by an even black line, all following the margin of the wing in shape. A broader white space before the black line, and followed by a yellowish fuscous, more darkly edged band beyond the outer transverse, white median band, which forms a wide curve and is indented on the fold, below which there is a shorter and thicker white band to internal margin. This white median band is followed by black scales, dilates on costa, where the black shadings on either side of it are more obvious. Median and basal spaces white; inner line, bent on cell, running inwardly obliquely below to internal margin. Hind wings white at base, with a black basal line, a median black line, a little uneven and joined to the black discal point; beyond the wing is again narrowly white before a yellowish fuscous dark-edged band, not quite attaining costa. On the white terminal space a black, irregular line, broken towards anal angle. Edge of the wing yellowish fuscous. Beneath fuscous, the lines feebly reflected. *Expanse* 18 mil. *Hab.* Wisc. in Sept., Mr. Westcott.

OLIGOSTIGMA OBSCURALIS, n. s.

Agrees with *Albalis* in having no ocelli, in the elongate wings and pattern of ornamentation. Fore wings thickly sprinkled with fuscous, the median lines obliterate. The outer line indicated by a pale, indistinctly continuous, costal included shade. A straight, interrupted, dark-brown line before the edge, continued to internal margin. Hind wings white, crossed by two even subparallel fuscous lines, the outer the broader, the latter followed by a narrow white space before a terminal ochre stripe along the margin, edged by fine broken brown lines. Beneath, dull and pale. Head and thorax above dark fuscous. *Expanse,* 22 mil. N. Y.; Wisc.; in September.

TORIPALPUS TRABALIS, n. s.

♂ ♀ Specimens from Colorado registered under this name in my collection, are much larger than *Breviornatalis* from Texas and Carolina. The inner line on primaries is more uneven. The outer line is denticulate, and strongly so below the median vein. The color is more brown and white. The female antennæ are simple; the male pectinate with basal tufts. *Expanse,* 31 mil. This form, while resembling its ally, is very different at first sight, from its greater size and contrasting colors, the median space of the wings distinctly powdery white anteriorly. Four specimens examined.

NEPHOPTERYX SCINTILLANS, n. s.

Hind wings 8-veined. Three internal veins. Median vein 4-branched; cell closed by a fold. Vein 2 thrown off before extremity of cell opposite the apex of the angulate fold; 5 running closely alongside of 4 and touching it just before the point of origin of 3; 6 to external margin just below apices; 7 and 8 separate to costa near apices. Fore wings 11-veined; cell straightly closed; 4 and 5 close together at base; 6 nearer to seven than to 5; 8 out of 7, both to costa beyond apices; 9 and 7 near together at base from s. c. vein; 11 from the vein well within the cell; 10

wanting. Ocelli. Tongue scaled. Maxillary palpi untufted, concealed in the male. Labial palpi with long second joint, extended in front, longer than the head. Male antennæ with a tuft within a basal flexure. The entire insect is blackish, immaculate, shining; head, thorax and primaries with violet reflections; the usual marking are lost; the fringes are but little paler, interlined. *Expanse*, 24 mil. A number of specimens from Summit, Sierra Nevada, collected by Mr. Hy. Edwards. In one specimen the darker, upright, waved median lines can be made out on primaries, and a discal point, but as a rule it is very difficult to perceive them.

NEW GENERA AND SPECIES OF NORTH AMERICAN NOCTUIDÆ.

By Henry Edwards.

Euros. nov. gen.

Head small, deeply inserted in the thorax, which is densely clothed with appressed scales. Palpi, short, truncate, with rather short hairs. Abdomen extending beyond the wings, rather short, with small basal tuft. Antennæ simple. Tibiæ almost smooth, tarsi densely clothed with rather long hairs. The first pair very short, and furnished with a thickened process, terminating in a blunt spine; middle pair, long, with long spine, and the posterior pair with two short spines. Wings ample; the anterior pair about twice as long as the width; rounded at the apex.

This genus appears to be closely allied to Anarta, the form of the markings being somewhat similar, but the coloring of the primaries offers a very wide distinction, and the curious structure of the legs affords good characters for the formation of the present genus.

Euros proprius, n. sp.

Primaries reddish brown, with all the lines and the margins of a deeper shade. Along the costal margin are some whitish scales. The basal half line, the t, a. and t. p. lines are dark-brown, the two latter very wide apart on costa, but approaching each other on the internal margin.

Reniform and claviform, yellowish brown, the latter unusually large. Submarginal line, sinuato-dentate, yellowish in color. Fringes reddish brown, darker at the extremity of the nervures. Secondaries, smoky black, with small white discal spot. Fringes, reddish brown. Underside, smoky black, broadly reddish brown along all the margins. Thorax, yellowish-brown, with reddish scales. Abdomen, smoky black, concolorous with the posterior wings.

Exp. wings. 0.75 inch.

1 ♂ Strawberry Valley, Siskiyou Co., Cal. Mrs. Hy. Edwards.

Type. Coll. Hy. Edwards.

LYGRANTHOECIA WALSINGHAMI. n. sp.

Allied to L. Separata Grote. Ground color of wings sordid white, Basal shade, light cinnamon brown, darkest posteriorly. Median space, clouded with crimson brown, heaviest towards the costa. T. a. and t. p. lines broadly bordered with white. Behind the t. p. line is a flexuous band of cinnamon brown reaching nearly to the apex. Margins whitish, clouded with brown. Fringes, alternately white and brown. Secondaries, sordid white, with a rather indistinct discal spot, and waved, submarginal band, fawn color. Fringes, white. Underside, wholly sordid white, with faint indications of reddish brown submarginal band and discal spot. Exp. wings, ♂ 0.70 inch. ♀ 1.00 inch. Klamath Lake, Oregon, Lord Walsingham, to whom I have much pleasure in dedicating this species. Type. Coll. Hy. Edwards.

ADONISEA PULCHRIPENNIS, Grote. Var. languida. Hy. Edw.

Whole upper surface thickly mottled with blackish scales, obscuring the beautiful violet crimson shade so conspicuous in the typical form. The bluish transverse lines are, however, very distinct, while the broken whitish band in front of the t. p. line is more strongly marked, by being thrown into greater contrast by the duller and darker ground color. Secondaries with the base and margins broadly black, enclosing a sub-lunate whitish space. Underside, sordid white. Margins of wings, except costa of secondaries (which is rosy), smoky black. Discal spots, large and distinct.

Havilah, Cal., R. H. Stretch. 1 ♂. Coll. Hy. Edwards. This form suggests the close relationship between Adonisea and the following genus.

MELICLEPTRIA BELLADONNA, n. sp.

Head and thorax covered with long brown hairs. Abdomen glossy black, with small dorsal tuft at the base, dark brown, the same shade as the hairs of the thorax. Primaries, rich brown, darkest towards the base, and along the internal margin. The discal field is whitish, with brown irrorations. The reniform and sub-reniform are very large, dark brown, almost black, narrowly edged with white. A blotch of the same dark color rests on the internal margin, and another of triangular shape touches the costa, near the apex of the wing. The t. p. line is blackish-brown, very narrow, and much curved anteriorly as it reaches the costa. Sub-marginal border, light brown. On the extreme margin is a row of brown triangular spots between the nervules. Fringes brown.

Secondaries broadly black at base, and on the margins, enclosing a large subovate white patch ; fringes brown, edged outwardly with white.

Under side : Primaries brownish black, as are the margins enclosing large cream white space ; reniform and sub-reniform black. Secondaries same as the upper side ; tibiæ black, with brownish hairs ; tarsi, sordid white. Exp. wings, 1.30 inch.

3 ♂ 2 ♂. Southern Utah.

Type. Coll. B. Neumoegen.

MELICLEPTRIA ELABORATA, n. sp.

Size of M. Villosa, Grote. Primaries with the base black, flecked with crimson and yellow scales, the costal edge crimson, with a linear white spot resting on the sub-costal nervure ; median band cream white, slightly sinuate posteriorly, and broken in front by a portion of the basal space, which here covers the central portion of the cell ; posterior third of the wing, bright rosy crimson, enclosing a clouded streak of black and yellow scales ; fringe yellowish white, except at the apex, where it is a brownish black. Secondaries black, with rather wide median band of cream white, broken in front by a small triangular black patch ; fringe cream white. Under side : Primaries rosy at base and apex ; a cream white band divided by a black spot ; internal half of the posterior portion, smoky black. Secondaries cream white, blackish along the anal margin, with the posterior half rosy, narrowly edged with black. Thorax covered with long golden hair ; the tegulæ shading into purplish rose color ; abdomen densely clothed with long yellow hairs, as are also the tibæ and tarsi. Exp. wings, 0.75 inch.

1 ♂ Colorado. H. K. Morrison.

Type. Coll. Hy. Edwards.

Probably the most beautiful of the genus, rivalling the exquisite Adonisea Pulchripennis, Grote.

MELICLEPTRIA PERMINUTA, n. sp.

Allied to M. Diminutiva, Grote, but much smaller and differing by the following characters. The primaries are dark brown, dotted with white scales, the macular band being composed of three spots, the largest being oblong, about the middle of the wing, and nearly touching the outer margin. Above this, in the anterior extremity of the cell, is a small roundish spot and a linear one in the median space, nearer to the t. p. line. In M. Diminutiva these spots assume the form of a band, and the ground color of the wing is redder, and wants the irrorated appearance of the present species. Secondaries black, with discal spot, and another near the anal margin, pure white. Underside black, primaries with wide median band and discal spot white.

Secondaries similar to the upper side. Exp. wing, 0.50 inch. Four examples. ♂. ♀. Bear Valley. Sier. Nev., Cal.

Types. Coll. Hy. Edwards.

ORIBATES, nov. gen.

A genus of small moths, having at first sight the appearance of Pyralidæ. The palpi are rather long, densely clothed with hairs; thorax moderately stout, vestiture hairy, passing into flattened scales, at the junction of the abdomen, which is somewhat extended beyond the posterior wings; legs clothed with closely appressed hairs; fore tibiæ unarmed in both sexes; the two posterior pair, each with a long spine; Antennæ simple-wings moderately broad, very much rounded on the apices.

ORIBATES MUIRII, n. sp.

Primaries dull orange, flecked with blackish scales, and the base shading into deep brown; in the central space there is also a blackish cloud, and the posterior margin is also blackish, as are the fringes. Secondaries, a rather lighter shade of orange, with a narrow regular marginal border, and the fringe black. Underside, entirely dull orange, with a narrow marginal border, and small discal spot on the primaries, black; palpi whitish, as is also the base of the tibiæ; thorax bluish, with some yellowish and brown hairs; abdomen, black at the base, the posterior half dull orange, concolorous with the posterior wings. Expanse of wings ♂ 0.40, ♀ 0.50, inch, 2 ♂ 3 ♀. Tuolumne Co., Cal. Jno. Muir, to whom I have great pleasure in dedicating this interesting species.

Type. Coll. Hy. Edwards.

ORIBATES LIMBATUS, n. sp.

Primaries with the basal space sordid white, with a few brownish patches on the costa; posterior portion, rich purplish brown, mottled with a paler shade; a dark brown, triangular patch on the costa near the apex; fringe two shades of brown; Secondaries, bright orange, with marginal line of black; fringes, brownish; thorax and abdomen above concolorous with the base of the forewings; beneath whitish, as are also the tarsi; the under side of the wings is orange, as in O. Muirii, with some small brownish patches on the costal edge of primaries, and the apex also broadly brownish. Size of O. Muirii.

4 ♂, 5 ♀ Mazatlan, Mexico.

Type. Coll. Hy. Edwards.

This insect when disturbed, alights among loose stones, something after the habit of Syneda, and it is then extremely difficult to discover. The specimens in my possession were taken on a rocky hill near the city of Mazatlan. It may yet be found within our borders.

ANNAPHILA AURANTIACA, n. sp.

A curious form, differing extremely in its coloration from the remainder of the group, and at first suggesting a new genus. I can however, find no characters by which it may be separated. The primaries are light brown, with darker brown markings; the reniform is clear creamy white; the basal lines are obliquely waved and broken, and the t. p. line is pale, deeply sinuate, and resting on a dark cloud; margin dotted with black; fringe brown. Secondaries, bright deep orange, with an oblong black discal spot, and a rather broad marginal band of black, slightly waved internally, and narrowing at the anal angle; base of the wing with long smoky hairs; fringe smoky brown. Underside, bright orange, with a broad smoky black border to both wings; very wide at the apex of the primaries, which have a blackish subbasal dark round spot near the apex of the cell, and a large oblong one at its posterior extremity; the secondaries have a sub-ovate discal spot; thorax, abdomen and legs, light fawn color, the scales having a slight golden reflection.

Exp. wings, 0.75 inch, 1 ♂ Geysers, Cal. R. H. Stretch.

Type. Coll. Hy. Edwards.

ANNAPHILA PUSTULATA, n. sp.

Allied to A. Domina. Hy. Edw., but differing by the lines of the primaries being white, and by the presence of a large square black velvety patch, behind the reniform, filling up the whole of the posterior portion of the cell. The reniform is whitish, and thus the insect has a more mottled appearance than is usual. Secondaries orange, as in A. Domina, but the discal spot is oblong and much larger than in the allied species, while the marginal band is here more sinuate, and narrows in the middle to a mere line, the band being broadest at the anal angle. Thorax and abdomen smoky black, the latter above thickly dotted with white scales. Underside pale orange, with the margins smoky black. In the centre of the primaries is a large cuneiform black patch, divided by the whitish reniform and by a white line near its posterior portion. The secondaries have, in addition to the blackish margin, a sublunate discal spot and some scales near the anal angle, black. Exp. wings, 0.80 inch, 1 ♀. Prescott, Arizona. W. Howard. Type, Coll. Hy. Edwards.

ANNAPHILA ARVALIS, Hy. Edwards.

This species described by me (Proc. Cal. Ac. Sc., 1875), from Dr. Behr's M. S. name, must be rechristened, as Arvalis is already occupied in the same group, viz., Axenus Arvalis, Grote. As the present form is usually found upon catkins of willow, I propose for it the name of *Annaphila Salicis.*

TARACHE SEDATA, n. sp.

Size of T. erastrioides. Primaries cream color along the costal half, interrupted in the middle of the wing by an oblique oblong brownish streak, by an almost square brownish patch above the reniform, and by a deep brown shade at the apex. The inner half of the wing is rich greenish brown, inclosing a small sub-triangular fawn-colored patch at the middle of the internal margin. The t. p. line is deep brown—very much sinuo-dentate, and running from the posterior third of internal margin to a point very close to the apex. It is surrounded by a brownish cloud, in which are some bluish scales. On the internal half of the posterior margin is a sublunate cream colored patch, and the margin has a series of black triangular dots between the nervules. Fringe white, brown at the apex. Secondaries smoky white, with a very faint reddish tinge. Underside dull smoky white, darker on the margins and at the apex of the primaries. Thorax white in front, brownish on the disc and behind. Abdomen concolorus with the lower wings.

1 ♂ Prescott, Ariz. W. Howard. 1 ♂ Tucson, Ariz. W. S. Edwards. Type. Coll. Hy. Edwards.

FRUVA ACERBA, n. sp.

Primaries dull smoky black, with a few scattered bluish scales. The costal half of the base, an almost square spot on costa near the apex, and a triangular one on the internal margin, sordid white. The two latter form an interrupted band. The t. p. line is velvety black, visible only on the internal margin. The submarginal line is composed of velvety black dots, edged posteriorly with a silvery reflection. Fringe smoky. Secondaries smoky brown, with white fringes. Underside wholly smoky brown, with satiny reflection. Thorax and abdomen concolorous with the wings, the former with a few bluish scales. Exp. wings, 0.75 inch.

1 ♂. 3 ♀. Sonoma Co., Cal.
Type, Coll. Hy. Edwards.

FRUVA ACCEPTA, n. sp.

♂. Primaries bright ochraceous, with a darker median shade reaching to the posterior margin, but not spreading to the apex. At the base is an oblique stripe of cinnamon brown, and a narrow line of the same color along the costa. Secondaries smoky brown, fringe ochraceous. Thorax ochraceous; abdomen concolorous with the secondaries. Underside dusky ochraceous, yellowish along the internal margin of the primaries and the secondaries of rather a lighter shade.

♀. Primaries with the base bright chestnut brown on the internal margin, pale ochreous on costa, the latter color also extending obliquely along the internal margin toward the internal angle. Apex pale ochreous. The rest of the wing blackish, thickly covered with ochreous scales. Secondaries brownish, as in the ♂.

Underside smoky brown, with the costa and inner margin of primaries pale ochreous.

3 ♂. 2 ♀. Tallahassee, Florida. Mr. A. Koebele.

Types. Coll. Hy. Edwards. Exp. wing, 0.70 inch.

LITOCALA SEXSIGNATA, Harvey.

n. var. *Deserta.* Hy. Edw.

A form occurring in Colorado and Arizona in which the primaries are much more profusely mottled with white, the median space and large reniform spot being almost clear white. The spots of the secondaries are also more yellow and considerably larger, the large discal one being more irregular in outline than is the case in the typical form.

SYNEDA SEPOSITA, n. sp.

♂. Size and aspect of S. Adumbrata, Behr. The primaries are blackish at their base, covered with whitish scales. The anterior line enclosing the middle space is deeply toothed near the second submedian nervule and is deep black. Median band moderate in width, nearly equal throughout its length, bright chestnut brown, shaded with a paler tint anteriorly. Behind this, almost touching the costa, is a sub-oblong white patch. This rests on a dark brown field, broad on the costa, extending up towards the apex, but greatly narrowed on the internal margin. On the costa are faint indications of small greyish blotches. The sinuo-dentate submarginal line is white, edged with dark brown, and the space between it and the margin is brownish, with grey scales, becoming paler at the internal angle. Marginal line scalloped, black, edged outwardly with grey. Fringe, brown. Secondaries, dull yellow, with a waved median band of black, deeply toothed in the middle, and joined to another band in the centre, which passes to the base of the wing. The margin has two sub-ovate black spots, joined by a black line, and the abdominal margin is also blackish. Fringe, yellow, mottled with black. Underside, yellow, the primaries with blackish margin, with a submarginal band of black, joined to a median one of the same color, meeting before reaching the internal margin. Secondaries, similar to the upper side.

Exp. wings ♂ 1.35 inch. ♀. 1.45 inch.

S. Colorado. Type. Coll. B. Neumoegen.

SYNEDA HASTINGSII, Hy. Edw.

N. var. *Perpallida.* Hy. Edw.

A peculiar form of the above species, in which the primaries have the margins much browner, and the secondaries yellow instead of crimson. The markings are otherwise identical. It cannot be confounded with either S. Divergens Behr. or S. Adumbrata Behr., as the submarginal band is nearly straight inwardly, and very widely separated as in S. Hastingsii from the oblong discal spot.

1 . Summit Station, Sier. Nev. California.

Type. Coll. Hy. Edwards.

SYNEDA ADUMBRATA. Behr.

n. var. *Saxea. Hy. Edw.*

Much smaller than the typical form, and differing also in having the primaries of a reddish tint, and the submarginal pale band proportionately narrower. The discal patch of secondaries, too, is nearly always separate from the waved submarginal band, and not connected with it as in the allied form, while the underside is of a richer orange, with the markings heavier and more distinct.

Exp. wings, 1.45 inch. *S. Adumbrata,* 1.75 inch.

Colorado, H. K. Morrison. Higher Sier. Nev., Hy. Edwards.

Type. Coll. Hy. Edwards. 3♂. 4♀.

MELIPOTIS TENELLA. n. sp.

♂. Primaries with the basal space grayish fawn color, darkest on the costa, and terminated by a broad black line running obliquely to the middle of the inner margin, straight anteriorly, and slightly sinuate behind. A wide fawn colored median space, twice as broad on the costa as on the internal margin. Behind this, resting on the costa, is a large whitish patch, shading into fawn color, and surrounded outwardly by a deep brown shade. This white patch has a deep tooth about the middle, and encloses a dark-brown linear mark at its junction with the fawn-colored median band. Posterior margin of the wing light grey, dotted with brown scales. Fringe, greyish brown, except the apex, which is white. Secondaries pure white, with a marginal band of black, passing into a narrow waved line on the anal angle, and with a very faint black discal dot. Fringe, broad, white. Underside clear white, with slightly opalescent tint. Primaries with an imperfect submarginal blackish band, and a central one, oblique, joining the submarginal before it reaches the inner margin. Secondaries, with very faint trace of the marginal band, but with a large subovate black spot near the anal angle. Thorax fawn color. Abdomen brownish gray, as are also the tibiæ and tarsi.

♂. Similar to the ♀., but the secondaries are dusky, with the marginal band a little wider.

Exp. wings, 1.40 inch.

N, W., Texas. J. Boll.

Types. Coll. B. Neumoegen.

SYNEDOIDA SABULOSA, n. sp.

Primaries, dusky brown. Basal space, blackish with drab-colored scales. Median band, stone drab, broad on the internal margin, turning suddenly forward on reaching the median nervule and narrowing greatly on the costa. The space behind the median band is the same color as the base, and encloses the usual sub-costal spot, which is here whitish, edged with brown, and with a small tooth anteriorly below the middle, irregular on its posterior edge. Submarginal space, greyish. Margin, blackish, scalloped, with the fringes stone drab, pointed with brown at the extremity of the nervures.

Secondaries, sordid white at the base, broadly shading into dusky on the margins. Sublunate discal spot, very distinct. Underside, sordid white, with the margins and a central shade joined to submarginal band, dusky.

Exp. wings, 1.40 inch.

4 examples, ♀ ♂ Southern Colorado.

Types, Coll. B. Neumoegen.

SYNEDOIDA INEPTA, n. sp.

Ground color of primaries, reddish fawn color, as also is the thorax. The lines are distinct, and are blackish in most examples, though sometimes they are almost lost in the ground color of the wing. The ant. line is very broad, oblique, only slightly toothed. The basal space is a little paler than the median band, which is a reddish fawn color, nearly equal in its width throughout, and terminated posteriorly by a faint black line. On this, near the costa, rests a small and almost obsolete white blotch, toothed posteriorly, and surrounded by a blackish shade. The sub-median space is greyish, with some dusky lines indicating the course of the nervures. Sub-marginal space, bright fawn color, the termination of the nervures marked by black lunules. Fringe, concolorous. Secondaries, sordid white at the base, the margins, as are also the nervures and the lunate discal spot, smoky black. Fringe, reddish white. Underside, wholly sordid white, with a broad blackish shade crossing the primaries near the middle, and a faint linear shade near the apex. Fringes concolorous. Exp. wing, 1.40 inch.

5 examples, ♂ ♀ Southern Colorado.

Types coll. B. Neumoegen.

SYNEDOIDA MORBOSA, n. sp.

In this species, which is closely allied to the last, the general color is pale ochreous, with all tne lines, though strong, somewhat confused in their outline. The basal space is larger than in S. Inepta, and the reniform is well marked, almost black, and surrounded by a dusky cloud. In S. Inepta, the reniform is obsolete. Along the costa are four blackish triangular patches, the apical largest. At the base of the costa are four indistinct black dots. The t. a. line is oblique, toothed outwardly, and there is no line visible on the median space between it and the submarginal line which is broad, slightly dusky, sinuous, with two large teeth directed outwardly. On the margin, between the nervures, are brownish lunules. Fringe concolorous. Secondaries, sordid white, margin broadly dusky, as is also the lunate discal spot. Beneath, entirely sordid white, with dusky shade in centre of the primaries, and the margins sometimes dusky. Thorax ochreous, with pinkish scales. Abdomen, sordid white, with blackish scales. Exp. wings, 1.50 inch. Several examples. ♂. ♀. Colorado, Utah, Arizona, Florida. Types Coll. B. Neumoegen, Hy. Edwards.

It is possible that this and S. Inepta, may prove to be extreme forms of the same species.

HOMOPTERA RUBI, n. sp.

♂. General color, stone drab, lighter, and less brown than any other species known to me. Primaries with the t. a. line broad, oblique, approaching very closely to the base of the wing, rich brown, narrowly bordered with a darker shade. Median space sparingly dotted with blackish atoms. Reniform, sublunate, edged with dark brown. The t. p. line is very strongly marked, showing in vivid contrast with the pale color of the wings. It is rich brown, edged with a darker shade, with a deep tooth in the middle, joined to another brownish shade, which reaches the margin of the wing. Secondaries with a rather broad and distinct submedian band, brown, edged as in the superior wings, with darker shade, and several waved bands of dark drab both at the outer margin and towards the base. Thorax and abdomen concolorous, with the collar and thoracic tufts flecked with brown. Underside wholly of the color of the upper, with faint median double line on both wings, and a discal spot on secondaries, brown. The margins are also brown, and the whole of the wings thickly dotted with blackish atoms.

♀. Resembling the ♂, but with the brown bands of the upper surface almost obsolete, the insect being thus almost of uniform color. Exp. wings, 1.55-inch.

3 examples. Sacramento, Cal.; Havilah, Cal.

Typ. Coll. Hy. Edwards.

This species is most nearly allied to H. Atrilineata. Harvey, but differs from it by its large size, paler color, greater angularity of the t. p. line, and by the generally heavier markings.

A NEW SPECIES OF ARCTIA, FROM COLORADO.

By B. Neumoegen.

ARCTIA DETERMINATA, n. sp.

Head and palpi creamy white; orbits of the eyes black; a black spot on the vertex, between the autennæ, which are moderate, bi-serrate, of blackish color, but whitish at tips of pectinations. Thorax equally creamy white, with two prothoracic and

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] March 10, 1881. [No. 3.

BIOGRAPHICAL SKETCH OF M. ACHILLE GUENEE.

By A. R. Grote.

Monsieur Achille Guenee died at Chateaudûn on the 30th day of December, 1880, in the 72d year of his age, and the world has lost an excellent Entomologist.

I remember well the little old town, perched on a hill near the left bank of the Loire, and overlooking the valley through which that river makes its way. Its castle and churches, the square in front of the inn filled on market days early in the morning with sellers of country produce of all kinds; its paved streets without trees, and for the most part without sidewalks; a ruined archway, with an inscription, incomplete and defaced, of "Liberté, Egalité," and the rest (a curious commentary on the appearance of the horrible old women who picked up the droppings on the streets for a living)—all this and much more I noticed between my arrival in Chateaudûn one evening and my call on M. Guenée the next day, as by appointment. For M. Guenée then, it being summer, lived out of town, but was to come in and open his house for my reception.

The collaborator of Dr. Boisduval, in the "Species Générales des Lepidoptéres," was a thin, rather short, dark, beardless man, polite and pleasant as most as most of his nation are, but with a good heart behind his somewhat diplomatic manners. The house was old, dark and gloomy, and probably appeared at an additional disadvantage from having been closed for the summer.

Before proceeding to examine his collection of types of American moths, which was the main object of my visit, we sat down to a déjeuner a la fourchette, consisting chiefly of a bottle of good wine and an ancient game pasty, in which latter I half suspected I should find some entomological acquaintances had taken up their dwelling.

M. Guenée's collection was contained in glass boxes, many of the type specimens being separately put up. The rest of the day was spent in looking this over and comparing my own specimens with M. Guenée's types. Unfortunately, the collection which I had brought with me was comparatively small, and M. Guenée no longer possessed types of a great number of moths, American species, which he had described. I, however, verified or corrected a number of my previous determinations of his species, and was able to make several new ones, which I have since disseminated among entomologists in this country.

With the evening we parted, promising each other a future meeting, which was destined never to take place. This was in 1867. Our correspondence since that time had been slight, but only recently M. Guenée had sent me an outline drawing of some of his species of Noctuidae, which enabled me to recognize his *Mamestra Passer* and his *Celaena Exesa.*

So far as American Lepidopterists are concerned, their interest in M. Guenée begins and ends with his six volumes in the series of the "Species Générales." There is no necessity at this time to enter into any detailed criticism of this work. Its publication and the friendship of Doubleday gave to its author a popularity in England, which he can hardly be said to have outlived. In Germany, M. Guenée's classification of the moths met with decided and growing opposition among the best entomologists. For myself, being a student of his work, especially the volumes on the Noctuidæ, I believe him to have been an excellent describer of species, but a deficient observer of generic characters. The material out of which M. Guenée composed his genera *Agrotis*, *Noctua*, *Hadena*, *Mamestra* and *Aplecta*, is badly selected, and species are consorted without regard to natural characters which had been already discovered by Stephens and earlier writers. On the other hand, the effort of M. Guenée to gather structural features from *all* the stages of the insect, merits favorable notice. The North American species of Noctuidæ which he has described, I have been able largely to make out from his published descriptions. A few species of *Acronycta*, *Leucania*, *Hadena*, etc. remain unknown to me. Among single forms which should be sufficiently striking are *Lepidomys Irrenosa*, *Mythimna Culea*, and *Cleoceris Onychina*, that I have not been able to recognize as yet in any of our collections. M. Guenée also drew up descriptions of several species from drawings by Abbot, and none of these have been satisfactorily identified and probably cannot be.

Notwithstanding the criticism of Clemens, published in the Proceedings of the Academy of Natural Sciences of Philadelphia for 1860, and which, while it may be considered in the main correct, is particular and unnecessarily personal, M. Guenée's work retains a literary and scientific value, which atones for its now apparent defects. It is, however, somewhat curious to find Dr. Clemens taking Guenée to task for overlooking the ocelli in *Dory-*

odes, and at the same time advancing the statement that these organs are always absent in the *Phalenites*, which is not the case. In fact the absence or presence of ocelli cannot be considered of family value in the Lepidoptera. And when we compare Dr. Clemens's writings on the Phycidae, we can see how easy it is to neglect to observe structural characters in the moths.

M. Guenée will always survive in the memory of American Entomologists so long as they find *Catocala Parta* on the willows, or, at dusk, take *Plusia Thyatiroides* hovering over flowers. The impartial historiographer will, I think, always recognize the fact that the works of M. Guenée have done much to encourage the general taste for Entomology, as well as to advance our knowledge of their special subject, and this must be sufficient to keep his name and fame bright among us. Dr. Packard, in naming the genus *Gueneria*, says that American lepidopterists are under lasting obligations to M. Guenée, in which statement I heartily concur.

NEW NOCTUIDS, WITH A LIST OF THE SPECIES OF ONCOCNEMIS.

BY A. R. GROTE.

ONCOCNEMIS MAJOR n. sp.

Eyes naked; fore tibiæ with a claw; middle and hind tibiæ unarmed; abdomen untufted. Dark gray, closely resembling *Chandleri*, but larger, without the basal black dash, more uniformly dusky gray. Median lines indicated on costa, else lost. Median shade vague, broad, diffuse. Veins incompletely marked with dusky. A terminal series of black interspaceal dashes, neatly and evenly interrupted by the subterminal line, which is else obsolete. The hind legs are blackish fuscous, pale at base, with white interlined fringes. Two specimens, Colorado, Mr. Neumoegen.

ONCOCNEMIS AQUALIS n. sp.

♀. Eyes naked; fore tibiæ with a claw. Related to *Chandleri*, but stouter. Forewings bluish-white gray over blackish. All the lines obliterate. Subterminal line wanting. The gray concolorous stigmata with difficulty perceived; all three present. Veins obsoletely marked. A distinct series of black interspaceal terminal lines or streaks. Hind wings smoky, the veins soiled, slightly iridescent, fringes whitish, interlined. Collar light gray, dusky behind, narrowly lined in front; head blackish. Beneath paler, discal spots present; hind wings whitish, irrorate, with a dotted exterior line feebly marked. *Expanse* 38 mm. *Hab.* California.

This Californian form differs by the black interspaceal dashes not being interrupted by a transverse pale shade, which only shows in *Chandleri* where it cuts the dashes, but in var. (?) *Riparia* broadens into a whitish diffuse subterminal line.

The following is a new list of our species of *Oncocnemis*:

Genus ONCOCNEMIS Led.

Hind wings yellow.

1. *Hayesi* Grote, Bull. B. S. N. S. 1, 105, pl. 3, fig. 13. Colorado.
2. *Dayi* Grote, Bull. B. S. N. S. 1, 105, pl. 3, fig. 8. Colorado.
3. *Mirificalis* Grote, Bull. U. S. Geol. Surv. 5, 207. Nevada.

Hind wings soiled whitish or fuscous.

4. *Levis* Grote, Can. Ent. 121, 254. Colorado.
5. *Augustus* Harvey, Bull. B. S. N. S. 3, 73. pl. 3, fig. 5. Texas.
6. *Behrensi* Grote, Bull. B. S. N. S. 2, 65. California, in February.
7. *Glennyi* Grote, Bull. B. S. N. S. 1, 141, pl. 4, fig. 17. Colorado, in July.
8. *Cibalis* Grote, Can. Ent. 12, 244. Colorado.
9. *Homogena* Grote, Bull. U. S. Geol. Surv. 3, 800. Colorado, Nevada.
10. *Oblita* Grote, Bull. U. S. Geol. Surv. 3, 117. Nevada.
11. *Meadiana* Morrison, Proc. A. N. S. Phil. 1875, 60. Colorado.
12. *Chandleri* Grote, Bull. B. S. N. S. 1 107, pl. 3, fig. 9; id. 3, 87; Bull. U. S. Geol. Surv. 3, 117. Colorado.
    var. *Riparia* Morr., Can. Ent. 7, 213. Long Island; Buffalo, N. Y.
13. *Major* n. sp. Colorado.
14. *Aqualis* n. sp. California.
15. *Atricollaris* Harvey, Bull. B. S. N. S. 2, 273; id. 3, 73. Texas, Arizona.
16. *Saundersiana* Grote, Can. Ent. 8, 29. Canada; Illinois.
17. *Occata* Grote, Trans. Am. Ent. Soc. 5, 114; Bull. B. S. N. S. 3, 77, 87, pl. 2, fig. 6. Texas, California.

Hind wings black.

18. *Aterrima* Grote, Can. Ent. 11, 199. California.

HADENA CYMOSA n. sp.

Allied to *Arctica* and *Castanea*; darker than either, blackish brown; the thoracic tufts rufous; abdomen fuscous with dark dorsal tufts. Eyes naked. Forewings blackish brown, with the lines much as in *Arctica*, black; a black submedian dash. Stigmata large, black-ringed; orbicular, spherical, concolorous; reniform shaded with white and broken into white spots outwardly. Secondaries fuscous with darker exterior shading; beneath with discal spot. *Expanse* 45 mm. Washington Territory. Two specimens in my collection; others in collections of Messrs. Edwards, Tepper and Graef.

Deva Palligera n. sp.

Fore wings pale roseate or purplish, shaded with dark metallic yellow over median space below the median vein, at internal angle and on terminal space opposite the cell. Lines even, narrow, the outer line angulate below costa. Stigmata small, concolorous; orbicular rounded; reniform narrow, upright; a small round spot on median space just below vein 2 at its origin. Hind wings whitish, with a mesial line. Abdomen pale; thorax like fore-wings. *Expanse* 30 mm. Sierra Nevada. Hy. Edwards, two specimens.

This form differs from our Eastern *Deva Purpurigera* of Walker by the broader wings, paler color and distinctly annulate spots on the median space; the primaries have no dark irrorations, and are notably wider exteriorly. I retain the genus *Deva* as distinct from *Plusia*, on account of the thickly-scaled third article of the long and curved labial palpi. The genus is intermediate between Calpe and Plusia, and is one of several in our Fauna which take that position.

NOTES ON THE PACIFIC COAST SPECIES OF HEPIALUS WITH DESCRIPTIONS OF NEW FORMS.

By Henry Edwards.

The so-called species of Hepialus, inhabiting the Pacific Coast, are subject to the extreme tendency to variation, which appears, in most of the species of Lepidoptera, to prevail in that region, constancy in the general characters being the exception and not the rule, both in Rhopalocera and Heterocera, and the many forms of Argynnis, Colias Melitæa and Lycæna among the Diurnals, and of Alypia, Arctia, the present forms and many among the Noctuids seem to direct us to the earlier stages as the only means of clearly understanding their relative value as species. From a pretty close study of very numerous examples of Californian Hepiali, I am led to the conclusion that ultimately many forms will have to be included in one species, and that it is possible that H. Behrensii *Stretch*, H. Tacomæ, *Hy. Edw.*, H. Sceqnoilus *Behrens*, H. Montanus, *Stretch*; as well as H. Anceps *Hy. Edw.* and H. Rectus *Hy. Edw.*, will prove to be variations of one type. Subsequent investigation, alone, however, can assure us of this, and I, therefore, for the present, prefer to call attention to the differences which present themselves to me. For a rather large series of these interesting insects I am indebted to Mr. Oscar Baron of Mendocino, Cal.

Hepialus Rectus. *Hy. Edw.* n. sp. (?)

Size of and closely approaching Hepialus (Stenopis Pack.) Montanus *Stretch*, but differing from that species by the position of the maculate bands of the primaries. In H. Montanus, the median band starts independently from the costa, but joins the second submarginal band before it reaches the internal margin. In the present species, the oblique maculate bands, which are 4 in number, are independent and parallel throughout their whole course. The insect has a brighter and more distinctly brown color also, though this can hardly be regarded as a character of value.

Contra Costa Co., Cal.

Types, ♀ ♂ Coll. Hy. Edwards.

HEPIALUS ANCEPS. *Hy. Edw.* n. sp. (?)

Also closely allied to H. montanus, but of a much redder color, and with 3 bands instead of 4 as in H. Montanus, and H. Rectus. These 3 bands are distinct and independent of each other. The costal margins of both wings are very distinctly reddish brown, as are also the fringes, while in the former species, they are concolorous with the wings.

4 ♀ 2 ♂. Mendocino, Co., Cal.

Types. Coll. Hy. Edwards.

HEPIALUS INUTILIS. *Hy. Edw.* n. sp.

A small and obscure species, the size of of H. Modestus, *Hy. Edw.* and H. Lenzii *Behrens*. It is dark stone color over the whole upper and lower surface. On the primaries above are some scattered white scales, forming an indistinct oblique double band, and beneath are also a few irregularly distributed whitish scales. It thus differs considerably from H. Modestus, in which the wings are concolorous throughout, without any trace of markings.

1 ♀ 1 ♂ Summit, Sier. Nev. Cal.

Types. Coll. Hy. Edwards.

NOTES ON FITCH'S SPECIES OF TORTRICIDS.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, ME.

The late Dr. Asa Fitch has described several species of the *Tortricidae*, some of which entomologists have failed to recognize. In his Second Report (Trans. N. Y. State Ag. Soc. 1855, p. 473), he described *Brachytaenia Malana*, which has since been referred to the genus *Nolaphana* among the Noctuids. Immediately following this, on page 476, he described another species under the name of *Brachytaenia Triquetrana*, which he said was closely related to *Malana*. If he was correct, of course it does not belong to the *Tortricidæ;* but the description, though short, is quite suggestive of some species of *Teras*.

In his Third Report (Trans. N. Y. State Ag. Soc., 1856, p. 357), Dr. Fitch gave us his description of *Cræsia Persicana*, and what this insect might be has been a mystery until recently, when Prof. J. A. Lintner discovered the type among the insects in the collection at Albany, and had the great kindness to send it to me for examination. The original description of this insect is very faulty and misleading, for it gives black as one of the colors on the fore-wings, where it should give brown. This same species was taken by Dr. Packard, in Brunswick, Me., and sent to Dr. Clemens, who described it under the name of *Ditula ? Blandana* (Proc. Ent. Soc., Phil., vol. 3, 1864, p. 515); and in 1869 Dr. Packard himself described it in his Guide, page 335, where he names it *Lozotœnia Fragariana ;* and in 1875 Prof. Zeller described it in his Beiträge under the name of *Tortrix* (*Argyrotoxa*) *Conigerana.* By some oversight, Prof. Zeller placed it in the subgenus *Argyrotoxa*, when it should have been put in *Ptycholoma* Steph. As the description of Fitch antedates the others, the insect should be called *Ptycholoma Persicana* (Fitch).

In the same report, page 382, Dr. Fitch described his *Lozotaenia Cerasivorana*, which is well known, but should be referred to the genus *Cacoecia* Hüb.

On page 459 of the same report, *Ephippophora Caryana* is described by Fitch; but Dr. Shimer, not recognizing this, redescribed the same species by the name of *Grapholitha Caryae* (Trans. Am. Ent. Soc., vol. 2, p. 394, 1869).

In 1858, Dr. Fitch, in his Fifth Report, described his *Argyrolepia Quercifoliana* (Trans. N. Y. State Ag. Soc., p. 826, and I am indebted to Prof. Lintner for an opportunity of examining the type of this species. Prof. Zeller redescribed the same thing in his Beiträge, in 1875, by the name of *Tortrix* (*Argyrotoxa*) *Trifurculana.* The species should be called *Tortrix Quercifoliana* Fitch.

I am not aware that Dr. Fitch described any other species of the *Tortricidae*, and these are now all known save *Brachytaenia Triquetrana*, if indeed this is a Tortricid.

In the Second Report of Dr. Cyrus Thomas, Entomologist to the State of Illinois, page 114, Miss Emma Smith gave the natural history of what she called *Argyrolepia Quercifoliana* Fitch, including, with notes of her own, the description of Fitch; and in a foot note by Dr. Thomas it is stated that "Prof. Fernald has identified this as Zeller's *Tortrix Trifurculana.*" After seeing the above report with this statement, I tried to obtain examples of Miss Smith's insect to see what it really was, and finally succeeded in obtaining it through Prof. Lintner, but it proved to be *Tortrix Flaccidana* Rob., a very different insect from *Quercifoliana* Fitch. I am in no way responsible for the identification of Miss Smith's insect, for I never saw an example of it till long after the report was published.

DESCRIPTIONS OF NEW SPECIES AND VARIETIES OF ARCTIIDÆ.

By Henry Edwards.

Euprepia Opulenta. *Hy. Edw.* n. sp.

Primaries sordid white. At the extremity of the cell, two minute brownish dots, and beyond them a broken irregular brown patch, and another at the extremity of the median nervule, broken up into small irregular patches on the posterior margin. Apex of the wings brownish. On the internal margin near its posterior termination, are two brown triangular spots and a small brown dot about the middle of the interior margin, resting above the submedian nervure. Secondaries, scarlet with an orange tint. On the costa, near the apex, is a small golden yellow blotch, a circular spot of the same color in centre of the wing, and another near the anal angle. There is also a small golden yellow mark at the extremity of the cell. There are two submarginal black spots. surrounded by a ring of golden yellow, the one nearest to the costa being oblong, and the other circular. Beneath, both wings are washed with scarlet, the primaries having 2 submarginal black spots, and a median band of golden yellow. Apex sordid white. Secondaries with a yellowish band on the costa near the base, and the markings of the upper side, faintly repeated. Thorax above, brownish black, except its front, which is scarlet. Patagia, whitish. Abdomen scarlet above and below, imperfectly banded with black. Legs and under side of thorax, dusky brown.

Exp. of wings, 2.00 inch.

1 ♂ Yukon River, Alaska, 700 miles from the mouth. F. A. Smith.

Type. Coll. Hy. Edwards.

A most remarkable and unique form. If a variation of any species, I know not where to refer it, as it appears in some respects to differ structurally from A. Caja. L. I know of no other species of which it can possibly be a variety. It is extremely interesting, not only for its beauty and its curious appearance, but also from the locality of its capture.

Arctia Incorrupta. *Hy. Edw.* n. sp.

Closely allied to A. Blakei, *Grote*, but differing from that species by the presence of a distinct sub-basal band, broadest on the costa, and running quite across the wings to the internal margin of the primiaries. The costa of the secondaries is rosy, and the black marginal spots are clearly cut, 4 in number and not confluent on the costal apex. There are no discal spots as in A. Blakei, but the wing is rosy to the base. I have seen 6 or 7 examples of A. Blakei, and have found the costa of secondaries in all of them rather broadly black, and the discal spots, 3 in number, as in M. Stretch's figure. (Zygænidæ and Bombyc, N. A. Page 224. Plate 9.)

3 ♀ Prescott, Arizona, 1 ♂. Dalles, Oregon.

Type. Coll. Hy. Edwards.

ARCTIA ACHAIA, *Bdv.*, VAR. BARDA. *Hy. Edw.*

A dark form of A. Achaia. in which the sub-basal transverse line of primaries is wanting, and the rest of the lines are much narrower than in the usual form. The secondaries are quite black at the base, along the costa, and very broadly so upon the posterior margin—the red markings being reduced to a moderately broad and deeply dentate band, touching the anal margin, and surmounted by a small ovate discal spot. In a second specimen, the red band encloses a small black spot.

2 ♂. North. Calif. Dalles, Oregon.

Type. Coll. Hy. Edwards.

ANTARCTIA PUNCTATA, VAR. PROBA. *Hy. Edw.*

Under this name I call attention to a form of the above species, which differs from the type by having the secondaries always concolorous with the primaries in both sexes, and by the maculate band being more broken up into spots. It is the mountain form of this insect, all the specimens I have examined having come from the higher Sierra Nevada, where it appears to be perfectly constant in color and marking.

3 ♂ 2 ♀. Truckee, Summit Station and Bear Valley. Sier. Nev., Cal.

Types. Coll. Hy. Edwards.

HALESIDOTA INGENS. *Hy. Edw.*, n. sp.

Allied to H. Sobrina, *Stretch*, but differing by its extreme size and some changes in the form and number of the spots. Head at base, front and sides of thorax, yellowish white; middle of thorax and front of the head rich brown, as also on the palpi, chest, and base of tibiæ. Abdomen above, pale buff with brownish band at the sides, and dull white beneath. Primaries rich brown, with four rows of white spots, the basal one very irregular in shape, and composed of three spots, the sub-basal one of four spots, and the median submarginal rows are oblique, and are composed of six and seven spots respectively. Between the median and sub-basal row is a large sub-oblong spot on the costa, and the margins have a row of small triangular spots at the termination of the nervules. Secondaries sordid white, yellowish at the base, with a small discal spot, and a row of confluent marginal spots, from the apex to the median nervule, black. Beneath, the markings of the upper side are faintly repeated.

Exp. wings., 2.50 inch.

1 ♀. Prescott, Arizona.

Type. Coll. Hy. Edwards.

The largest species of the genus known to me.

A CHOREUTES ON SILPHIUM INTEGRIFOLIUM.

By A. R. Grote.

Mr. Coquillett has communicated to me specimens of a *Choreutes* which he has reared, together with a description of the larva. The species appears to be new and is considered by Professor Fernald to be distinct from *Pretiosana.*

CHOREUTES SILPHIELLA, n. s.

Thorax orange, with a metallic stripe on the tegulae. Head olivaceous. Pectus and basal joint of palpi whitish. Fore wings with the base orange, to a dusky, inwardly oblique, transverse shade line. A longitudinal metallic stripe before the shade line below costa and some metallic scales below median vein. Middle of the wing mottled, grayish, enclosing two metallic discal spots edged with black, superposed; below them two faint blackish lines to internal margin. Apical portion of the wing taken up with a wide circle of dusky and orange scales enclosing a series of metallic points edged with black. The space enclosed by the circle, near the margin, is gray and mottled like the middle of the wing. The metallic spots have a violet or green reflection. The circle is twice cut by oblique orange stripes, over the sub-costal nervules and over the median nervules, in opposing positions. Edge of the wing dusky, fringes dark. Costal edge with two white dots beneath, wide apart. Hind wing blackish; beneath crossed by a white sub-terminal band, and another before the middle of the wing. Length of forewing 5 to 6 mm. *Hab.* Illinois.

The larva of this species is described by Mr. Coquillett as follows:

CHOREUTES SILPHIELLA, *Grote.*—Body thickest at the middle, tapering toward each end, pale green; a dark colored dorsal line; piliferous spots and cervical shield green; head small, nearly horizontal, pale green, with a black dot on each side near the jaws, and usually with a black dash on each side near the junction of the head with the first segment; venter pale green, unmarked; 16 legs; length, 13 mm. Lives in communities on *Silphium Integrifolium* in nests formed by fastening the terminal leaves together with silken threads. Found June 19; imagoes July 2.

A distinct but allied species of *Choreutes* has been collected Mr. Hy. Edwards in California (*Sierra Nevada*).

DESCRIPTIONS OF GEOMETRIDÆ, CHIEFLY COLLECTED BY MR. PILATE.

By A. R. Grote.

PLAGODIS FLOSCULARIA, n. sp.

♀. Larger than the other species, and of a different color. Fore-wings vivid lemon yellow, with the costa, at base, touched with pinkish brown, and the costal edge, between the two transverse shaded lines, washed with very pale pinkish. The two lines merely indicated. Basal line a little darker yellow than the ground color, and apparently including double narrow lines, arcuate. Outer line commencing near apices, where it is touched with red; below this obsolete and appearing again as a dark brown line, edging inwardly a large pinkish brown patch on internal margin before the angle. Apices with a red fleck. Hind-wings pale yellow, fading to whitish to costa and base. At internal angle is a patch, margined by darker lines, corresponding to the patch before internal angle of primaries. Body lemon yellow, anus shaded with reddish. Breast and head pinkish. Venter shaded with reddish. Wings beneath lemon yellow; the pinkish patch at anal angle of secondaries distinct and somewhat diffusely extended. There are no irrorations on the wings of this lovely insect, which expands an inch and a half. Ohio. Mr. G. R. Pilate.

ASPILATES GAUSAPARIA, n. sp.

♂. Smaller than *Lintneraria.* Antennæ bipectinate. Upper surface of wings and body entirely concolorous, dusky purplish red. Primaries crossed by three faint black lines formed by aggregations of the black scales with which the wings are besprinkled. A sub-basal arcuate line; a waved median shade line; both of these a little diffuse. A narrower, uneven line at apical fourth, continued to internal margin. A black discal dot just beyond the median shade, surrounded by a brighter tinting on the cell. Hind-wings with dot, and the outer line continuous. Beneath much paler, with dots, and an outer common line. *Expanse,* 26 mm. Wisconsin.

DEILINIA GLOMERARIA, n. sp.

♀. White; wings sprinkled with blackish. Front, between the eyes, reddish. Wings entire; hind-wings rounded. Small black discal dots on both wings. A single regular denticulate blackish extra-discal common line crosses both wings. The dark powderings are more massed on terminal space of fore-wings, before the fine, incomplete terminal line. Beneath more whitish, with the dots distinct and the line indicated. In its course this line is a little bent on primaries above, running in over the median nervules. *Expanse* 26 mm. Ohio, Mr. J. R. Pilate; Canada.

In this species and the following the tibiæ are not incrassated. I do not know the males, which prevents my feeling sure that they belong to this genus.

DEILINIA SEPTEMFLUARIA, n. sp.

♀. White, with brownish irrorations. Front a little reddish. Hind-wings slightly produced at the middle. Ornamentation distinct. Fore-wings crossed by three even ochre lines; the first, arcuate, beyond the base; the second nearly straight before the middle of the wing; the third at three-quarters from base, a little bent opposite the cell, else nearly straight. Just beyond this line is a faint dark line, not easily perceived, containing a distinct dark scale blotch between veins 3 and 4. This and the outer two ochre lines are continued across hind-wings, which also have the scale blotch in the same place. Beneath the markings repeated; discal marks; the irrorations are coarser and yellowish in part. *Expanse* 23 mm. Ohio, Mr. G. R. Pilate.

PAPILIO ECCLIPSIS, A DOUBTFUL OR LOST N. AMERICAN BUTTERFLY.

By Dr. Herman H. Hagen.

I desire to draw attention to the famous Papilio Ecclipsis *Linn.* The specimen is figured by Petiver in Gazophylaz. Pl. 10, fig. 6; the quotation by Kirby, pl. 33. f. 11, is erroneous, and refers to Erebia Portlandia. Petiver, p. 16, says "It exactly resembles our English Brimstone Butterfly (R. Rhamni), were it not for those black spots and apparent blue moons in the lower wings. This is the only one I have seen." In the Catalogus Classicus, p. 2, this species is put by Petiver among the European insects.

Linne described the species, 1763 (not 1764 as stated by Kirby) in Centuria Insectorum p. 23, No. 67. He quotes Petivers figure as "bona" and says: Habitat in America septentrionali, *De Geer*. Therefore a specimen must have existed in De Geer's collection, but this is not described in his memoirs, nor mentioned in Retzius' Catalogue. Linné repeats his description in Syst. Nat. Ed. XII, p. 765. Werneburg has overlooked that Petiver put his species among the European insects, and does not mention it. W. F. Kirby, Synon. Catal. p. 488, quotes the species in brackets, and says; "spec. fict." America. I think it should be examined if the species is still in Petiver's collection which belongs to the British Museum. If it is really fictitious, perhaps the specimen in De Geer's collection came from the same maker. After all De Geer's collection is still preserved and in good condition in Stockholm. I think Linnæus must have had some data to give the country as North America. It is sure that Linné has described another fictitious insect—the famous *Scarabæus Tridentatus*. But here the falsification of blue moons seems somewhat more difficult if not impossible. It occurs to me that perhaps the P. Ecclipsis is an insect near to Colias Caesonia, now not represented in cabinets, or a remarkable variety. At least the above quoted collections should be searched for a more satisfactory explanation.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] April 26, 1881. [No. 4.

DESCRIPTION OF NEW SPECIES OF BUTTERFLIES.

Chiefly collected by Mr. Morrison in 1880.

BY W. H. EDWARDS, *Coalburgh, W. Va.*

1. Anthocharis Morrisoni.
2. Melitœa Perdiceas.
3. " Colon.
4. Pyrgus Philetas.
5. Copæodes Eunus.
6. Pamphila Mardon.
7. " Siris.

ANTHOCHARIS MORRISONI.

Male. Expands 1.5 inch.

Size of A *Cethura.* Feld. (*Cooperi* of But. N. A. Vol. 1) and very close to it on upper side; color of primaries, white; of secondaries, white, washed with grayish on part of cell and middle of disk, and faintly beyond to hind margin; both wings gray at base. Primaries, have costa spotted black, not densely. The spots nearest to base, rather large and well separated; towards apex, black and white alternate in about equal proportions; on apical area, a large bright orange patch; along apex and hind margin to lower side, the patch a series of black confluent crenated spots. The one on upper median nervule, diffused into an irregular patch; the lower branch of median edged black at extremity; the mark on arc of cell, black; straight, narrow and of even width. Secondaries have a few black scales at the ends of all nervules, and the fringe there is black, otherwise, white; fringe of primaries, also black at ends of nervules.

Under side of primaries, pale yellow-white; the patch, deep yellow, and beyond it a small pink-tinted space towards apex; the nervules on apical area green edged, losing the green scales mostly, quite at the margin; costa marked by black spots at nearly equal distances, about one third the space being black, two thirds white; cellular mark repeated, interrupted a little below middle; secondaries marbled green, not after the pattern of *Cethura*, but as in A. *Hyantis*, the green being dense, with clear white openings, which are mostly along costal and hind margins. (*Cethura* has the green area much broken, macular, with full half the wing white, and this is yellow washed)

From 2 ♂ from Southern California. Female not observed.

MELITAEA PERDICEAS.

Male. Expands 1.7 inch.

Upper side a dull brown-black, spotted with buff and dull red, the arrangement of the spots being as in *Chalcedon* and allied species; all red dull and inclining to orange, both hind margins edged by a series of red spots, those next apex of primaries a little the largest, the rest nearly equal; on primaries, this is followed by a row of minute spots, red and yellow, mixed; on secondaries, by minute yellow spots, but the two in the median interspaces are considerably larger and lunular; the third row on primaries is sinuous, the spots small, rounded, yellow; the fourth row is also sinuous, red or red and yellow, except the last spot on inner margin, which is yellow; outside arc of cell a demi-row of three spots, yellow edged, without red; in cell a yellow cross bar and a patch near base, and between these, and outside the bar, a few red scales, a large rectangular spot below cell: on secondaries, the third row is obsolete, or represented partially by a slight cluster of yellow scales; the fourth, or discal row, is yellow, and on basal area are four yellow spots, the two in the cell sometimes connected by a narrow ligament on the outer side. Fringes, yellow-white, black at the ends of the nervules.

Under side, dull red over disk of primaries, a shade lighter next base, the hind margins of both wings, dull orange. The second row of spots on primaries repeated in yellow-white, enlarged and now lunular, edged posteriorly by black. The third row repeated, edged anteriorly by black, and the other yellow spots are imperfectly repeated, or are indicated by a lighter shade. Secondaries have a submarginal series of yellow-white lunules, not much excavated, edged on all sides by black (all nervures and branches being black). The next or third row is composed of dull orange lunules. The discal band, broad, yellow, cut by a black line near the outer edge. On basal area five large yellow spots, separated by narrow spaces rather red than orange, or, at least of a lighter color than the orange beyond disk; shoulders, yellow.

Body dull black, red hairs back of head. Below, the thorax covered with long black hairs, abdomen red, with yellow along middle; legs and palpi red; antennæ, brown above, reddish below; club reddish, with a little black at tip.

Female. Expands 1.7 inch. Same color as male, and marked in a similar manner, only the submarginal lunules of hind wings are decidedly yellow, are larger in proportion, and are deeply excavated.

From 1 ♂ 1 ♀ taken at Mt. Hood, Oreg. Several years ago I received three males of this species from Hayden Expedition in Idaho, but they were so rubbed and damaged that I could make no accurate description of them. I submitted them to Mr. Henry Edwards, and one of them still has his label on the pin with the expressed opinion that it is a new species.

MELITAEA COLON.

Male. Expands 2 inches.

Near to *Chalcedon*, Bois. Upper side black, dusted yellow at base of primaries, spotted with yellow-buff and red. Costal edge of primaries red, all red deep; both wings have a marginal border of red spots, largest next apex of primaries, and diminishing regularly to inner angle. The spots of secondaries small, even-sized, sometimes wholly wanting; followed on primaries by a row of minute spots, mixed red and yellow; on secondaries by a row of small yellow spots,, sometimes more or less wanting. The third row on primaries is sinuous, and made up of small yellow spots, nearly even. The fourth row is also sinuous, not quite parallel to third; approaching it on mid-wing, red, except the spot on costa and the one in sub-median interspace which are yellow or mixed; at end of cell without are three small spots, mixed; in cell a transverse bar and a patch near base, both yellow. Red scales between and outside these spots; a yellow patch below cell. On secondaries the third row is obsolete, a few red or yellow scales indicating the position of some of the missing spots. The fourth row crosses the disk, yellow; on basal area, either four or five yellow spots, according as the two in cell are confluent or not; fringes, buff, black at ends of nervules.

Under side of primaries, bright red from base to margin. The second row of spots represented by yellow lunules on anterior half of the wing, each edged-posteriorly by black. The yellow spots of third row are repeated. The yellow spots in and below cell indicated by a lighter shade of red, and edged on one or both sides by black.

Secondaries still darker red; the marginal band red; then yellow lunules edged above and below with black; then a red band, not made up of confluent lunules, but a nearly even band, with no yellow, and crossing from margin to margin; next a yellow discal band, as broad as the red one, just preceding, cut unequally, and near the posterior edge by a black line; also, edged black on basal side; basal area red, with five yellow spots, the red ground posterior to the spots and also along inner margin forming bands about as wide as the yellow discal band; shoulder yellow.

Body above black, deep red hairs on thorax. Under side of thorax covered with long yellow and grey hairs; abdomen red, yellow along middle; legs and palpi deep red; antennæ red-brown above, red below; club dull red above, with some black, red below.

Female. Expands 2.3 inches,

Upper side black, marked like the male; the spots generally larger. Under side like the male in color. Primaries have the submarginal lunules entirely across the wing, narrow, and deeply excavated. The spots of third row edged black on basal side. Secondaries have the sub-marginal spots almost lanceolate, high, narrow, and deeply excavated, edged above and parted by black.

Form 3 ♂ 2 ♀ taken at Mt. Hood, Oreg. This species may be at once distinguished from *Chalcedon* by the second red band on secondaries, which is here unbroken, not lunular, and is without yellow. In *Chalcedon* this row is made up of red spots, larger or smaller, on black ground, usually more or less edged yellow. The females of *Chalcedon* usually have a yellow central point to the red spot; sometimes the ground is yellow on black, and on this the red spot. I have seen the red belt of *Colon* in no California *Chalcedon.* Also in *Colon* the submarginal yellow lunules on secondaries are of quite another shape from *Chalcedon*, more lanceolate, more deeply excavated. Mr. Morrison took no *Chalcedon*, but many *Colon* at Mt. Hood. I have not seen it from any other locality.

PYRGUS PHILETAS.

Female. Expands 1.2 inch.

Upper side of primaries pale black, of secondaries brown; marked with white much as in P. *tessellata*; the spots smaller; both wings have two parallel rows of dots along the hind margins. Primaries a bent row of spots across the disk; a spot in cell near arc, two or three below cell, and white dashes along costal margin. Secondaries have a discal row of obsolescent spots, mere streaks; fringes of primaries, alternately white and pale black; of secondaries, wholly white.

Under side of primaries, olive-brown on disk, paler towards hind margin; base and basal part of costa whitish; the spots repeated, enlarged. Secondaries white with yellow tint; no discal band as in *tessellata*, the disk and basal area being white, with a few brown dots and streaks, of which three dots on costal margin are most distinct; two streaks across cell; beyond disk are three rows of small or minute spots, the two outer ones corresponding in position to the marginal spots of upper side; these are white, lunular, indistinct, and over them the ground is somewhat dusky; the third, or innermost row consists of brown dots only, at anal angle a dusky patch.

From a single example received in 1879 from the late Mr.

Jacob Boll, and taken by him in Western Texas, on one of his last expeditions. The under side of secondaries is quite unlike any described American species.

COPAEODES EUNUS.

Male. Expands 1 inch.

Upper side light honey-yellow, the hind wings slightly edged fuscous, as also costa of primaries: the ends of all nervules on primaries black for a little distance; costal margin of secondaries dark brown ; on primaries a black streak from base for a little way along sub-costal, and behind cell a black oblique streak from origin of upper branch of median across the two median interspaces; fringes, color of wings.

Under side of primaries on disk lighter than above, but towards the hind margin and apex, yellowish, with brown edging to all nervules nearly up to end of cell, rather broad next hind margin and narrowing gradually, costa edged brown. Secondaries yellow, much sprinkled with black scales which largely follow the nervules and branches, but leave a clear yellow space from base through cell to hind margin, and another from base below cell to margin.

From a single male, taken at Mt. Hood. A quite distinct form.

PAMPHILA SIRIS.

Male. Expands 1.15 inch.

Upper side dark brown over whole of secondaries, apex, and hind margin back to cell and stigma of primaries. The rest of primaries fulvous; three fulvous spots in sub-costal interspaces, and an oblique row of three fulvous spots along the top of discoidal and median interspaces; stigma narrow, sinuous, with a deep brown patch behind; inner margin a little fulvous from base nearly to inner angle; on disk of secondaries, a curved narrow band, not distinct, except on mid-wing, color dull fulvous; also, a spot nearer base, indistinct. Fringes cinereous, a little fulvous near inner angle of secondaries.

Under side of primaries brown, dusted with fulvous, and dull fulvous where the upper side was bright; black at base; the spots repeated and more yellow, and the oblique line has a fourth spot; secondaries brown, still more thickly dusted with fulvous scales; a yellow row of spots on disk nearly parallel to costal and hind margins, and a long spot in cell.

Female. Expands 1.28; color of male, but with no fulvous; the spots distinct, clear fulvous, in the oblique line four; a long irregular patch on centerpart of cell; the row on secondaries more distinct. Under side deeper fulvous, almost cinnamon.

From 3 ♂ 3 ♀ taken at Mount Hood, where it seems to replace P. *Mystic*, the nearest allied species.

PAMPHILA MARDON.

Male. Expands 1 inch.

Upper side obscure yellow-fulvous, dusky along hind margin of primaries nearly to cell; three indistinct fulvous spots in subcostal interspaces, and others behind cell, but scarcely distinguishable, in some examples obsolete; stigma rather broad, sinuous, narrowly bordered behind with dull black; secondaries either immaculate or with an obscure fulvous discal band; fringes pale fuscous on primaries, somewhat yellowish on secondaries.

Under side pale ferruginous over secondaries and disk, hind margin and apex of primaries; the inner margin dusky, the base black; the costal spots repeated, two minute spots below these nearer hind margin, and three in oblique row below cell; all these pale fulvous. Secondaries have a discal band of pale fulvous starting on middle of costal margin and curving nearly with the outline of the wing to submedian; a patch on cell.

Female. Expands 1.1 inch.

Upper side color of male, the spots larger and distinct, pale fulvous; a fulvous dash within cell near extremity; under side paler than in male, the spots more yellowish.

From 3 ♂ 3 ♀ taken at Mt. Hood.

In my Catalogue this species would stand next *Agricola*. Bois. It is of broader and less produced forewing, duller color, and without a dusky patch between ends of stigma and apex.

NEW SPECIES OF DICOPIS, CHYTONIX AND SPRAGUEIA.

BY A. R. GROTE.

DICOPIS DEPILIS. n. s,

♀. Smooth, dark grey in color, recalling *Eutolype Rolandi*, but without the metallic tuft of scales on the thorax behind which separates *Eutolype* from *Dicopis*. Interior line fine, black, projected opposite the claviform spot. Claviform with a tinge of yellowish, moderate, somewhat rounded and incompletely ringed with black. Orbicular, spherical, concolorous gray, with a paler ring edging the faint annulus within. Reniform similar, very large, medially constricted. Outer line fine, irregular, waved, much removed outwardly. There is a flecking of yellowish outside of the fine sub-terminal line, which runs very close to the outer median line, at internal angle. Hind wings whitish, with gray shaded edging and fringes; beneath with dot and line. Head and thorax dark gray. Size of *Muralis*, or perhaps a little larger and seemingly stouter. Columbus, Ohio.

The described species of *Dicopis* are becoming more numerous. Excluding Prof. French's *Dicopis Vitis*, which does not belong here, and is a synonym of *Mamestra Distincta*, we have five species. I have seen the type of *Electilis*: it seemed to me near to *Muralis*. *Thaxterianus* is distinguishable by the brownish primaries, and their long oblique exterior margin, as well as by ornamentation; it is very distinct from the other species. *Damalis*, from California may be known by its blue-grey color. Finally, I have a female specimen from Texas, collected by Belfrage, which comes near to *Depilis*, but may prove a distinct species; it is numbered "697." *Eutolype Rolandi*, has in both sexes the metallic thoracic tuft, unusual in the moths, and analogous to that found in *Tolype* and *Eudryas*. Our species of *Dicopis* are as follows; *Muralis*, *Electilis*, *Thaxterianus*, *Damalis*, *Depilis* and possibly an undescribed species from Texas.

CHYTONIX SENSILIS, n. s.

♀. Larger than *Iaspis* and much darker. Eyes naked; thorax covered with flattened scales; abdomen strongly tufted. Brownish fuscous, with a reddish stain over the subterminal line. Stigmata a little paler than the wing, the reniform medially constricted, enclosing a black shade, separated into an upper and lower spot. Lines black, uneven, rather wide apart. T. p. line running outwardly below costal edge, thence downwardly and outwardly obliquely to over median nervules, with a slight indentation opposite the cell. Below vein 3 it runs a little inwardly and thence straightly to internal margin. Attached to it on the submedian fold is an elongate, squarish, pure white spot. Subterminal line uneven, toothed over median nervules. Hind wings, blackish fuscous. Beneath paler, with a continuous dark, extra mesial line and shade; on fore wings the slight discal mark is surmounted by a dark costal shade spot. Discal spot on secondaries a small annulus. *Expanse* 31 mil. Massachusetts, in Mr. Thaxter's collection. I also saw a specimen determined as "*iaspis*" in the collection of the Boston Society of Natural History. I mention this because this erroneous determination is probably still more widely spread. Guenee's *Apamea Iaspis*, the type of *Chytonix*, is related, however, to *Jaspidea* (*Bryophila*). Indeed, it may be only a variety of his *Bryophila Palliatricula*. Both have a black sub-median dash across the median space, and the vague white shading over median space above in *Palliatricula* absorbs the small white dot of *Iaspis*. I have referred both species to *Chytonix* elsewhere. In the present form the white spot is more elongate. The color is more reddish brown and the insect faintly resembles *Dryobota Stigmata*. The ground color of *Sensilis* is a somewhat pale, brownish fuscous, shaded with darker at the base and on the median space inferiorly. In the disposition of the darker shades there is a parity with *Iaspis* and *Palliatricula*, but there is a red-brown tone wanting in its allies, while the insect is darker and larger. The t. p. line is not so rounded opposite the cell, the inner line not so oblique, waved, with a sub-median indentation; the lines do not appear so widely separate in *sensilis* as in its allies.

That our determination of *Iaspis* admits of no doubt, follows from Guenee's description. He calls the color "very pale testaceous grey," and the body "slender." The rest of his description falls in with our specimens, of which I took several males in the vicinity of Buffalo in July. In arranging our Noctuidæ I saw at once that Guenee's *Apamea Iaspis* could not remain in the same genus with his other species, which are mainly Hadenas, and I made it the type of a new genus. Only later I saw its affinity with Guenee's *Bryophila Palliatricula*, although so widely separated by him, and I divided it on the character of mixed and flattened scales on the thorax. I believe the genus containing *Iaspis*, *Palliatricula*, (if these two are distinct) and *Sensilis* should be placed next to *Bryophila*, but until the European species are all compared its exact value cannot be ascertained. The species are more robust and have a somewhat Hadeniform appearance. They all have a white spot attached to the t. p. line, while it is lost in the white shading of the median space in *Palliatricula*.

SPRAGUEIA PARDALIS. n. s.

Allied to *Dama*, by the orange fringes, which are flecked with black opposite the cell. Fore wings black, with a large, pale yellow oblique costal patch before the t. a. line; another on the median space enclosing a dark dot, and a smaller spot before the apex. Median lines broad, orange, only marked on the lower half of the wing. Hind wings blackish. The outer smaller pale spot on centre of primaries surmounts a little patch of orange and then some brown-black scales. These deep brown-black scales obtain below the larger median pale costal patch and cover the upper extremity of the outer median orange line. Front smooth, bulged. Collar edged with orange. Head behind, orange. Tegulæ orange within; the shoulders blue-black. Abdomen blackish, finely annulate with pale. Beneath, the body is pale yellow. *Expanse* 17 mil. Florida, several specimens collected by Mr. Roland Thaxter.

This species is more black than any of the others and is easily recognized by the pale white costal spots extending to the middle of the wing. For a discussion of the structure of *Spragueia* and allied North American genera I refer the student to a paper published in the Canadian Entomologist, Vol. XI, p. 231.

ON SOME APPARENTLY NEW FORMS OF DIURNAL LEPIDOPTERA.

BY HENRY EDWARDS.

ANTHOCARIS COLORADENSIS. n. sp. (?)

I have long had in my possession a ♂ example of Anthocaris, which appears to be distinct from any known form, but I hesitated to describe it until more material might present itself.

From Dr. Bailey of Albany, I now receive a ♀ exactly agreeing with my specimen, and I have also seen other examples in the collection of Messrs. Neumoegen and Mead. I therefore offer a description under the above name. Compared with *A. ausoniedes*, Bois. of which it is possibly a variety—it has the apices more rounded, and the wings, both primaries and secondaries, broader, though the average size of the insect is a little less. The broken patch at the apex of the fore wings, is, in the present form, deep velvety black, flecked with greenish scales, while in *A. ausoniedes* it is olivaceous, with yellowish scales. The patch is also more compact, less divided by the white ground color of the wings, the apex being therefore almost wholly black, with the exception of a roundish spot, costally, and a couple of dashes marginally, of the white ground color. On the under side, the marbled pattern of the secondaries is more extended over the whole surface of the wing, thus more closely approaching the design of *A. Crensa*, and *A. Hyantis.*

The present form appears to bear the same relations to *A. ausoniedes* that *A. Belia* does to *A. ausonia* of Europe. The specimens I have examined (4 ♂ 3 ♀) were all taken in Colorado.

Types. Coll. Hy. Edwards. Dr. Jas. A. Bailey.

COENONYMPHA CALIFORNICA. Doub. n. var. *pulla.*

Entirely of a dark fawn color, with a leaden tint on the upper surface, and a blackish cloud at the base of primaries, as in the var. *galactinus.* The markings of the under side are invisible, when viewed from above. Beneath, dull brown, with a reddish tint on the discal region of the primaries, the markings very indistinct, being lost in the prevailing dark color.

1 ♂ San Mateo, Co., Cal.

Type. Coll. Hy. Edwards.

MELITÆA DWINELLEI. n. var.

Most of the California species of *Melitœa* are prone to extreme variations, and none more so than the most beautiful of all, *M. chalcedon.* I have before me examples of a form, however, which is so remote from the typical specimens, and so constant in its characters, as to deserve a name. I have desired to link with it the memory of an esteemed friend, now passed away, viz: Mr. Herman Dwinelle, one of the most promising young entomologists of the Pacific coast, whose early death was a loss to science. The specimens of this butterfly were taken by Mr. Dwinelle at the McCloud fishing station, Shasta Co., Cal., and it is worthy of remark, that no examples of *Chalcedon* agreeing with the form common throughout the valleys of California, were found among the insects taken in the above locality. My examples are 4 ♂. 3 ♀

Primaries very much suffused with red, which color predominates over the discal portion, and toward the apices, almost obscuring the usual white spots, or rendering them a sordid, dull orange color. The secondaries have the marginal row of red spots clearly defined, but the sub-marginal row of white lunules, so strongly characteristic of *M. Chalcedon*, is here wholly absent, or reduced to a single row of small, white sub-ovate patches, thus leaving a broad, black field between the margin and the median band. Beneath, the upper wings are reddish over the whole surface as in *M. Chalcedon*, but the lower have a much larger space of yellowish white toward the base, the whole of the red band and blotches being more broadly edged with black.

MELITÆA BARONI. n. sp. (?)

Allied to *M. Quino Behr.* of which it may be a variety. The lower side is characterised by an intense reddish color over the whole surface, sometimes attended by great suffusion, while the black lines usually found above and below the reddish maculate bands, are either wholly wanting, or very faintly defined, and except in the space surrounding the central patches of the superiors, there is no black to be seen. I have examined about 40 examples of this form from Mendocino Co., Cal,, all with this peculiar system of coloration, and I have found these characters constant in every specimen, while the typical form of *M. Quino.* which *M. Baroni* resembles so closely on the upper side, has all the mark. ings of the lower, broadly and conspicuously edged with black. It will be found quite an easy matter to se parate these two species-

MELITÆA RUBICUNDA, n. var.

This is also, probably, another departure from the type of *M. Quino*, and may be its mountain form. In shape it is like *M. Quino*, and there is scarcely any appreciable difference on the lower side, but above the coloration is different. In *M. Quino*, black abounds, and overshadows both white and red. In this form red is the prevailing tint, and the submarginal bands of the secondaries are simply bands of red, cut by the nervules as in *M. Quino*, consisting of rows of spots. There is also a greater proportion of white about the base of the secondaries. My specimens, (18 in number) all agree in these characters. They are all from the Sierra Nevada, at an elevation of from 2500 feet to 7000 feet, while the typical *M Quino* is found nearer the sea level. *M. rubicunda* approaches somewhat closely to *M. nubigena*, Behr. It is doubtless so named in many collections, but it is not so entirely suffused with red, as the latter species, while the wings are broader, with the apices more rounded.

MELITÆA ANICIA. Doubl.

This species may be known by its narrow wings, with very pointed apices, as well as by the large proportion of white on the upper surface, and the almost utter obliteration of the red submarginal maculate band of secondaries. A strongly marked variety is occasionally found which I designate as

MELITÆA WHEELERI. n. var.

It is wholly of a pale red ground color on the upper surface, except the base of secondaries, which are cream white. The markings are as usual, but with very little black.

2 ♂ 1 ♀. Southern Nevada. Wheeler Expd'n.

Types. Coll. Hy. Edwards.

THECLA CITIMA. n. var.

A peculiar form of *T. crysalus*, Edw., in which the orange blotches at the inner angle of the primaries, and the anal angle of secondaries are all obsolete, or at best, very faintly indicated, The whole of the upper surface, therefore, being purple and black. The ground color of the underside is ash grey, instead of fawn color, and the markings are all much less pronounced than in *T. crysalus*, the orange points of both primaries and secondaries being almost wanting.

1 ♀. Mt. Nebo. Utah. Mr. J. D. Putnam.

1 ♀. S. W. Colorado. H. K. Morrison.

Types. Coll. Hy. Edwards. B. Neumoegen.

THECLA SPADIX. n. sp.

Size of *T. Putnami*, and allied to that species. Upper side, dull mouse color, darkest at the base, with a large chestnut shade on primaries, and entirely without other markings. Beneath, the usual bands on primaries are utterly obliterated. On the secondaries is a very faint sub-median band irregularly broken, and an equally faint discal spot. The marginal band is also indistinct. The lunules of the anal angle are dull brown, enclosing 3 patches of black and white scales. There is no trace of either yellow or blue. The abdominal hairs are grayish white.

Exp. wings, 1.00 inch.

2 ♀. Tehachepi Pass, S. California. R. H. Stretch.

THECLA NELSONI. Bdv. n. var. *exoleta*

I distinguish under this name a form of *T. Nelsoni*, in which the whole of the lower surface is dull chestnut brown, with the marginal lunules of the secondaries exceedingly indistinct. The narrow white median band of secondaries, and the sub-marginal band of primaries are entirely wanting. In all other respects it resembles the typical form.

2 ♀. Big Trees, Calaveras Co., Cal.

Types. Coll. Hy. Edwards.

THECLA MUIRI. Hy. Edw. n. sp.

Allied to *T. Nelsoni*, Bdv., but undoubtedly distinct. It is smaller, with the apices of the wing not much produced. The general color is darker than that of *T. Nelsoni*, and the fringes are concolorous with the wings, instead of white. Beneath, on primaries, is a very distinct, sub-marginal white band, perfectly straight, and not curved from the costa, as in *T. Nelsoni*. It is also placed very much closer to the margin of the wing. The secondaries are blackish brown and not chestnut, as in *T. Nelsoni*, and the sub-marginal band of white spots is more distinctly angular about the middle. It is also edged interiorly with a deep brown shade. Outside of this band, a purplish tint encloses the lunules, which are slate color, edged above with a few orange scales.

Exp. wings. 0.85 inch.

1 ♂ 1 ♀. Mendocino Co., Cal.

Types. Coll. Hy. Edwards.

I have named this exquisite little species after my friend, John Muir, so well known for his researches into the geology of the Sierra Nevada, who has frequently added rare and interesting species to my collection.

THECLA IRUS. n. var. *Mossii.* Hy. Edw.

Upper surface entirely bright chestnut brown, a little clouded with dusky at the apices, and on the extreme margins. Fringes wholly white, and not alternately brown and white, as in *T. Irus*, and the varieties *Henrici* and *Arsace*. Tails wanting. Under side, primaries reddish-brown, darkest at the base, and brightest at the margin. From costa entirely across the wing is a sinuous white band, bent outwardly at the middle, and edged above by a deep chestnut brown shade. The secondaries have the base deep blackish-brown of uniform color, above the usual sinuous band, which is narrow, whitish, with a very large and sharp angle at the median nerve. The marginal spots are large, distinct, bright chestnut brown, 6 in number, each surmounted by a small black lunule.

Exp. wings. 0.80 inch.

1 ♂. Esquimalt, Vancouver Island. Dr. Moss.

Type. Coll. Hy. Edwards.

I have for the present regarded this as a variety of *T. Irus*, but it is quite possible that it is a distinct species; the uniform deep brown base of secondaries giving it a most peculiar appearance. It is at any rate farther removed from the typical *T. Irus*, than either *Arsace* or *Henrici*.

THECLA TACITA, n. sp.

Allied to *T. adenostomatis*, Hy. Edw. Upper surface wholly pale plumbeous, a little darker at the margin, discal patch and the nervules also deeper in shade, and very distinctly marked. Tails of secondaries very small, linear, edged with white. Near the anal angle is a small and faint ochraceous shade; fringes of both wings sordid white; lower side paler than the upper, with very faint submarginal line of blackish lunules, and a median curved line of ovate spots equally faint; there is a black spot on the fringe at the extreme anal angle, followed by a patch of bluish scales, and a very pale yellowish triangular spot, narrowly edged with black; the whole of the markings are indistinct.

Head with white line at base of the eyes, and two small white dots at the insertion of the antennæ. Thorax and abdomen concolorous with the wings, the latter paler beneath. Tarsi ringed with white; hairs at base of legs bluish. Antennæ with white rings, club black, with the apex dull orange.

Exp. wings 1.00 inch. 1 ♂.

Mendocino Co., Cal. Mr. O. Baron.

Type. Coll. W. H. Edwards.

LYCÆNA SPECIOSA, Hy. Edw.

I had the pleasure of describing the ♂ of this beautiful little species in the Proc. Cal. Acad. Sc., Dec. 1876, but as that publication may not be accessible to the readers of PAPILIO, I copy the original description, and through the kindness of Mr. W. H. Edwards, am enabled to add that of the ♀ also, two specimens (♂ ♀) of this apparently rare butterfly having recently been taken in S. California by Mr. H. K. Morrison.

♂ "Pale silvery blue, somewhat the color of *L. melissa*, Edw., with the extreme margins black. Fringes, very broad, clear white, cut very distinctly by black at the ends of the nervules. Underside, pale silvery gray, with a very minute round black spot on the costa, and a series of five round sub-marginal and one oblong central spots arranged almost in circular form on the disc. There is also a distinct oblong discal spot, and a smaller round one on the internal margin. The whole of the spots on the primaries are comparatively large, very distinct, and jet black, without white margins. The secondaries have one basal dot, a minute discal point and a sub-marginal row of seven small black spots, also without white margins. Fringes, as in the upper side. Antennæ, with the club unusually large, and the shaft distinctly annulated with white. Thorax and abdomen, blackish above, silvery beneath.

Exp. of wings, 0.70 inches.

Havilah, Kern County, R. H. Stretch. (1 ♂ Coll. Hy. Edw.)

I should have hesitated to describe this exquisite specie from a single specimen, but the peculiar arrangement of the spots on the lower side of the primaries, its extremely small size, and the broad and distinctly black and white fringes serve abundantly to distinguish it from any other form with which I am acquainted." Proc. Cal. Acad. Sc. 1876.

♀ Upper surface, dull smoky black, with the fringes white, alternated with black, and some bluish scales at base of wings, and sides of thorax and abdomen. Under side, pale silvery grey, with brownish irrorations, internal margin of primaries broadly blackish. The spots on the forewings are unusually large and very clearly defined.

I think this species should be placed near to Lyc. Regia, Bois.

NOTES AND DESCRIPTIONS OF A FEW LEPIDOPTEROUS LARVÆ.

BY D. W. COQUILLETT.

CHAMYRIS CERINTHA, Triet.—Body nearly naked, a purple dorsal stripe, next to this is a pinkish line, below which is a broad greenish stripe; 16 legs, head gray, length 28 mm. Feeds on apple. One of these caterpillars assumed the chrysalis form on the 9th day of August, producing the imago May 28, of the following year.

APATELA BRUMOSA, Guenee.—Body black, marked with a broad yellowish-brown stigmatal stripe; hair in spreading clusters from warts, that upon each end of the body being yellow, the rest white; 16 legs, head black; length 38 mm. Feeds on plum and hazel; spins a thin tough cocoon. Two of these caterpillars assumed the chrysalis form in September, propucing the imagos in the last week in April and first week in May of the following year.

HELIOTHIS LUTEITINCTUS, Grote.—Body naked, light green, a dark dorsal line, on each side of the body are two white lines, 16 legs, head green; length 30 mm. One specimen taken on grass assumed the chrysalis form July 14, producing the imago on the 5th of the following month.

SCOLIOPTERYX LIBATRIX, Linn.—Body very slender, green, with a white line on each side, 16 legs; length 40 mm. Feeds on willow. One specimen spun its cocoon August 23, producing the imago on the 7th of the following month.

CATOCALA COCCINATA, Grote.—Body dark gray. a curved fleshy projection on top of segment 8; segment 11 slightly raised, with two tubercles on the top; a row of small prickles on the dorsal space, 16 legs, a black spot beneath each of the segments which bear the four pairs of abdominal legs, head gray, bordered with black; length 62 mm. Feeds on oak. One specimen spun its cocoon June 6, producing the imago the 30th of the same month.

CATERVA CATENARIA, Drury.—Body very pale yellowish, or greenish white, sub-dorsal and stigmatal space marked with four black lines; on each side of segments from 4 to 11 are two black spots between which is a whitish tubercle tipped with black; first segment yellowish, marked with about 12 black dots; venter, pale yellow, marked with six wavy black lines; 10 legs, head large, pale greenish yellow, marked on each side with about 6 black dots, length 38 mm. Feeds on hazel. Several specimens taken July 14 spun their cocoons about August 18, producing the imagos September 11.

EUPITHECIA INTERRUPTOFASCIATA, Packard.—Body greenish or yellowish, a brownish dorsal and sub-dorsal line, the latter sometimes obsolete, the dorsal line sometimes interrupted by a row of brownish spots; a brownish or yellowish line below the spiracles; venter greenish, with a light or yellowish line in the middle; 10 legs; head brown or greenish, sometimes marked with about four vertical brown dashes; length 15 mm. Feeds on clover. Found from June to September.

NOTES ON CATOCALA SAPPHO, STRECKER.

BY G. H. FRENCH, *Carbondale, Ill.*

Mr. Strecker, in noticing this beautiful species (part 11 of his Lep. Rhop. et Het.) intimates that he hesitated as to the propriety of describing it as a species, as he thought it might prove to be but a variety of *Agrippina*. Mr. G. D. Hulst, in commenting on the species in his "Catalogue of the Catocalae of North America, with Notes," (No. 2, vol. 3, of Bulletin, Brooklyn Ent. Soc.) says, "We incline very strongly to the opinion suggested by Mr. Strecker when he described it, that this very charming insect is but an extreme variety of *Agrippina*."

I can see why the namer of the species should hesitate when he already had a form of *Agrippina* with primaries suffused with white, and before him, perhaps, only a single specimen of *Sappho;* but my observations do not confirm his fears. As this is a very rare insect, and as I have been so fortunate as to capture two specimens, I will give briefly my reasons for believing it to be distinct from the allied form *Agrippina*. First. I do not know that *Agrippina* has ever been found in this State. I have hunted this region thoroughly, taking over forty different species of *Catocala*, and have never found it. Besides this, I have by considerable research and correspondence, been making a list of the *Catocalae* of Illinois, and I do not find that any one else has taken that species here.

The two specimens of *Sappho* above referred to, are as nearly alike as two specimens of *Desperata* or any other well marked species, the primaries having the two black patches extending from the costa, well defined; these and all the other marks agreeing with the figure accompanying Mr. Strecker's description. To find so well marked a form in such widely separated localities as Texas, Georgia and Illinois, all the examples agreeing with each other, and with no intergrades is in my mind, strong proof of its specific value. *Cara*, *Lachrymosa* and others have their well marked varieties, but in the extreme forms they usually vary somewhat, while the intergrades are more common than the extreme varieties. For these reasons, I am of the opinion that *Sappho* is a good species.

NEW NOCTUIDÆ FROM WASHINGTON TERRITORY.

BY A. R. GROTE.

The following species are among the collection made by Mr. Morrison last season in Washington Territory:

MAMESTRA LIQUIDA, n. s.

♂ ♀. Eyes hairy; abdomen untufted or but very slightly so at base. Allied to *Lilacina Legitima.* Forewings brown with the subterminal space widely shaded with bright lilac gray, the internal margin similarly shaded and also the t. a. line. The costal region of the subterminal interspace is left brown and the light gray shade passes over to apices. The s. t. line itself is pale, distinct, yellowish with the M-mark well indicated, thus distinguishing the moth from *Lilacina;* I find, however, that in *Legitima* the M-mark is variably distinct. Claviform spot outlined in velvety black; a blackish mark above and below vein 2 on t. p. line; vein 2 is marked by whitish scales. The median field is tinted with reddish which stains the reniform and extends beyond it. Orbicular, oval, a little oblique, gray with dark centre. Terminal space dark brown; a dark shade relieves the s. t. line on the inside. Fringes dark, cut with pale. Hind wings yellowish fuscous, with diffuse darker terminal shade; fringes concolorous. Beneath, the four wings show discal points while the lines are obsolete. *Expanse* 37 mil.

This species presents the same pattern as *Legitima,* the transverse lines are similar. It is not so red, and in the orbicular approaches rather *Lilacina,* while distinct in detail from either.

VALERIA? CONSERTA, n. s.

♀. Eyes naked; tibiæ unarmed. Abdomen tufted; vestiture coarse; thorax untufted. Blackish gray. Fore wings suffused with black. Lines black, thick, lost in blackish ground color. Base whitish gray. Inception of transverse anterior line distinct; the line shows an inward subcostal tooth. Stigmata obsolete. Terminal space gray with a terminal series of black dots at base of fringes. Hind wings soiled with blackish; beneath with a dotted extra mesial line and a discal mark. Collar white at base with a black line. Thorax blackish with the edge of the collar and the tip of the patagia shaded with gray. Abdominal tufts blackish. *Expanse* 34 mil.

From the structure of the thorax I am doubtful of the generic references. The species is so easily recognized that I describe it, and without recognizing the male.

HADENA SEMILUNATA. n. s.

Eyes naked; tibiæ unarmed. Thorax hairy, (the specimens are not well enough preserved to show the tufts.) The species has somewhat the look of an *Anarta* (*Sympistis*). Fore-wings blackish, with the lines edged with white. Orbicular oblique, elongate, edged broadly with white, with dark centre. Reniform upright, kidney shaped, blackish, with fine white annulus. T. p. line angulate opposite the cell. Sub-terminal line white, with a small W mark between veins 3 and 4. Hind wings yellow, with black borders and a well marked discal lunule; costal margin soiled, as are the veins. Beneath yellowish, with the four lunules evident. Fringes of primaries blackish, neatly cut with pale opposite the veins. *Expanse* 28 *mil.*

The white lines on the primaries contrast, and there is a whitish shade on median field between the sub-median fold and median vein.. The species resembles as little our Eastern *Hadena inordinata.*

The collections from Washington Territory contain many species originally described from California and Vancouver Island Since Mr. Morrison has sent me two of these as new species, I make here a partial list of these forms, so that the attention of those interested may be called to the matter. It seems to me probable that *Hadena cymosa* from Washington Territory is only a dark form of *Hadena castanea* from California.

Mamestra cuneata,
" cinnabarina,
Hadena indirecta,
" divesta,
" curvata,
" semilunata.

Xylomiges crucialis,
Deva palligera,
Behrensia conchiformis,
Plusia labrosa,
Actinotia Stewarti.

ON PAPILIO ECCLIPSIS LINN.

By Arthur G. Butler.

In part 3 of Papilio, Dr. Hagen calls attention to this species as one requiring identification, and suggests that it may be an insect (allied to Meganostoma cesonia) which remains to be discovered. If Dr. Hagen will turn to p. 226 of my "Catalogue of Diurnal Lepidoptera, described by Fabricius," he will find the following note respecting it. "P. ecclipsis, even in Petiver's figure, looks like a manufactured insect, and two cleverly painted specimens in the Linnean cabinet prove it to be so. Petiver described it as "Pap. sulphureus, lunulis cæruleis," etc. and placed it among his animals of Europe in the index to his work. Linneus, however, gave the locality" in America septemtrionali."

The specimens in question are stippled with thick body-color, and seen without a lens, might easily have deceived the older authors. In Petiver's collection there is nothing which at all resembles his figure; he has however a specimen of G. Rhamni, which may be the type of P. ecclipsis, washed clean, but it is quite possible that one of the specimens in the Linnean cabinet is Petiver's type.

British Museum, March 30, 1881.

NOTES ON THE PACIFIC COAST SPECIES OF ORGYIA, WITH DESCRIPTIONS OF LARVÆ AND NEW FORMS.

BY HENRY EDWARDS.

Four species of the genus Orgyia, are known by me to exist in California and the adjacent states, two of which appear to be as yet unknown to science. though one of them stands in such puzzling relationship to an allied form, that it is almost impossible to assign its true position as a species. The remarkable difference in the larval stage (which appears to be constant in both instances), is our only reliable guide as to the specific value of either, and a reference must be made to the early conditions of both insects, by those who wish for a perfect understanding of their relations to each other. The food plant is different in these two forms, and one (*O. vetusta*) is extremely rare where the other (*O. gulosa*) is found in abundance, while *O. gulosa* is not met with at all in the district in which *O. vetusta* is common. It is possible that both of these forms were known to Boisduval, and it is difficult to state positively which he intended to describe as *O. vetusta*, but a specimen which I had the opportunity to examine in the collection of Mr. Lorquin, of San Francisco, (by whose father most of the Lepidoptera of California, described by Dr. Boisduval had been collected), was decidedly belonging to the larger and more frequent form, and it is from this standpoint that the present paper is written.

I append descriptions of the larva as well as of the imago, of both of these closely allied forms.

ORGYIA VETUSTA. Bois.

Larva. Full grown.

Ground color, velvety black. Head black, rather shining with a yellow line in front; mouth parts bright yellow. From the second segment spring two bundles of long black hairs, as in all the species of the genus. The space between these is bright vermillion red; at the base of each segment is a series of 4 or 6 orange yellow dots, extended also to the sides; 3rd and anterior part of 4th more broadly and distinctly patched with orange. From the dorsum of 5th, 6th, 7th and 8th spring bundles of long silky hairs, whitish drab at their base, chestnut towards their tips. Along the lateral region is a double row of bright red tubercles, and on the 3rd, 4th, 10th, 11th and 12th, these extend across the body, 6 tubercles appearing on each segment. Out of these spring a series of long yellowish white hairs, sparsely interspersed with black, and becoming more decidedly yellow laterally. From the centre of 12th segment, a bundle of long yellow hairs, tufted with black; under side blackish; feet and pro-legs orange yellow, wlth the claws black.

Length 1.00 inch.

Food plant. Lupinus of various species, chiefly *L. arboraceus*, Sims. San Francisco to San Jose, common. Changed to chrysalis May 26. Imago emerged June 6. *Chrysalis.* Pitchy brown shining, with a few short bunches of hairs on sides of middle segments. The chrysalis is oblong oval, and is enclosed in a yellowish drab cocoon, closely spun, and composed of the paler hairs of the larva, with a few black ones intermixed, the paler ends of these hairs being always nearest the surface. The chrysalis is indistinctly seen through the web.

IMAGO.

"Forewings banded with fuscous, paler at the base with white spot at anal angle; hind wings reddish fuscous." Boisduval, Lep. de la Calif. p. 28.

The primaries in this species are decidedly a rich brown, slightly paler at the base, and with a grayish reflection when viewed obliquely. The white spot on inner angle is very distinct, and in the centre of the wing is a grayish space reaching to the costa, and in some specimens very pale and distinct. The usual lines are all very clearly defined. The secondaries are redder than the upper wings, and are concolorous with the abdomen.

Exp. wings, 1.15 inch.

ORGYIA GULOSA. Hy. Edw. n. sp. (?)

Larva. Full grown.

Ground color, as in *O. vetusta*, velvety black. Head jet black, without the yellow frontal line, and with the mouth parts dull yellow. 2d segment with the usual complex series of black hairs. Between them are two dark brick red tubercles. 3d has two orange central tubercles, and two brick red ones on the sides. 4th has black central tuft, with two brick red tubercles on each side of it. 5th, 6th and 7th, have each a white central tuft, with two brick red tubercles on each side. 8th, 9th, and 10th, each with six brick red tubercles. 11th, has a central tuft of black hairs, directed posteriorly, with two brick red tubercles on each side. 12th has only two brick red tubercles. Anal segment black. From the base of all the red tubercles arise bundles of black and white hairs, almost wholly white on the sides. Between the 7th and 8th segments are some bright orange dashes, which marks are also indistinctly seen on the anterior segments.

Length, 0.60 inch.

Food plant. Quercus, of various species.

Contra Costa Co., Cal., abundant, extending through the foothills of the Coast range as far as Shasta.

IMAGO.

The differences in the perfect condition of these two forms, appear to me as follows: *O. gulosa* is always much smaller than *O. vetusta.* The white spot near the inner angle is less distinct, and the lines on the primaries are invariably more clouded and confused. The ♀ is also much smaller than that of *O. vetusta*, and is brownish instead of smoky gray. I have frequently kept the larvæ of both forms, and have found that *O. vetusta* would not feed upon the oak, and *O. gulosa* would invariably refuse the lupins. All the species of the genus are ravenous eaters. This is probably a case in which two distinct species approach each other very closely in the imago condition.

Exp. of wings, 0.75 inch.

ORGYIA CANA. Hy. Edw. n. sp.

Allied to *O. leucostigma*, Sm. Abb. but differing from that species, by the absence of the white spot on the inner angle, and by the heavier and less oblique transverse lines on the primaries. The secondaries are also of a chestnut tint, and not concolorous as in *O. leucostigma*.

2 ♂ Havilah, California. R. H. Stretch.

Types. Coll. Hy. Edwards.

ORGYIA BADIA. Hy. Edw. Proc. Cal. Ac. Sc.

A careful comparison of the examples of this sp. in my collection, leads me to the conclusion that it is the same as *O. antiqua*, L. of Europe and it is more than possible that *O. nova*. Fitch, belongs to the same species.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] May 31, 1881. [No. 5.

NOTES ON THE GENUS CLISIOCAMPA, CURTIS.

With description of New Species.

BY R. H. STRETCH.

Probably there is no group of Bombycidæ inhabiting this country more worthy of earnest study than the one now under consideration. In an economical point of view, the agriculturist and the pomologist are liable to their attacks, while many of our ornamental trees and shrubs are marked by the depredations of the caterpillars. Their great abundance in certain seasons, and their extremely interesting habits, also serve to draw attention to these insects, while the difficulty which exists in clearly defining the various species, offers another incentive to the investigations of entomologists.

In studying the genus, we must depend chiefly on the transformations for the separation of species, and where these are unknown, not so much on color as on the structure and proportion of the markings, as the species are very variable and approach each other closely in the imagines.

The descriptions of some of the earlier stages are now, I believe, given for the first time. The genus has, undoubtedly been very properly separated from *Gastropacha* and from *Bombyx*, which latter included insects of different structure and of extremely different habits. *Clisiocampa* is thus well defined by Stainton:

IMAGO.

"Antennæ pectinated in the ♂, ciliated in the ♀; abdomen of ♀ rather stout and pointed; wings densely clothed with scales. Larva gregarious when young, dispersing before becoming full fed. Pupa enclosed in a cocoon of moderately fine texture, not transparent, because intermixed with a sulphur colored powder."

CLISIOCAMPA, CURTIS, Brit. Ent., Vol. 5.

C. CALIFORNICA, Packard, Proc. Ent. Soc., Phil., vol. 3, p. 387, (1864). *Bombyx pseudoneustria*, Boisduval, *Ann. Soc. Ent., Belg.*, vol. 12, p. 82, (1868-9).

Larva. Head black, legs black; feet on abdominal legs pale testaceous. Body black, faintly dusted with rusty, which forms an exceedingly broken and indistinct lateral line, and a more complete double dorsal line. Each segment carries a lateral, transverse, very faint linear dot, above the lateral line. The dorsal and lateral hairs are all tawny. The general appearance of the larva is tawny brown. Length about 1.40 inches.

Cocoon. The cocoon is constructed in the crevices of bark or in the angles of masonry where accessible, and consists of a loose, white web, in which is suspended the long ovate cocoon of dense papery consistency, thickened with a yellowish powdery gum.

This species is exceedingly abundant in the neighborhood of San Francisco, and is probably widely distributed. In this vicinity its favorite food plant is a species of scrubby oak (*Q.agrifolia*), but it is sometimes found on the blackberry (*Rubus*) and other shrubby plants. Its depredations do not seem to have extended to the orchards. The nests may be seen in warm localities as early as the middle of March, while in those more exposed they are not seen till the middle of April; but both these dates are sufficiently early to protect the orchards. The larvæ pupate in about six weeks from the egg, and the imago appears in about a fortnight.

The peculiar actions of these larvæ would appear to indicate the possession of organs of hearing. It is most amusing to stand near one of the nests on which the larvæ are clustered, and call out loudly and sharply. The larvæ begin to twitch convulsively, throwing the head from side to side as if annoyed by the sound; and if the sound is repeated, not unfrequently losing their foothold and falling to the ground. I do not remember to have seen any note of this peculiarity as common to the species found in the Atlantic States, and mention it to draw attention to what may prove an easy means of collecting the larvæ in orchards when they become troublesome.

C. FRAGILIS, n. sp.

♂ General color, soft chocolate brown. The primaries have a deep shade of this color at the base. The lines are whitish, and in strong contrast with the ground color of the wing. The inner band reaches the inner margin very near to the base, and curves slightly inward on the costa. The outer band is nearly parallel with the inner, the space between them being slightly increased at the costa. Fringes whitish, with dark dashes at the termination of subcostal and median nervules. Secondaries wholly pale chocolate brown, with no indication of band. Underside pale brown with a reddish tinge, and with very faint trace of median band on both wings. Thorax and abdomen somewhat paler than the base of the primaries. Antennæ, dark chocolate brown. Exp. wings, 0.80 inch.

♀ Lighter in color, and less opaque than the ♂. Head, thorax, legs and abdomen pale whitish brown; abdomen palest; prothorax and tegulæ darkest. Anterior wings pale, lustrous whitish brown, crossed by a broad dark band of the same color, but of a deeper shade. The inner edge of this band originates on the inner edge near the base, and curves round to the costa, which is reached at the basal two-fifths. The outer edge of the band is parallel with the outer edge of the wing, and curves outward as it reaches the costa, being followed outwardly by a narrow pale line. The band is palest centrally, and broader than the terminal space, and both its margins are toothed inwardly on the nervules.

Posterior wings concolorous with the band on the primaries, crossed by a pale median band.

Beneath, the wings are concolorous with the band on the primaries above, and the only markings are the pale whitish line outside the band on the primaries, and the median line on the secondaries, which are both more prominent than above.

3 ♂, 4 ♀

Expanse of wings, 1.10 to 1.40 inches. *Length of body*, 0.40 to 0.50 inches.

Habitat, Virginia City, Nevada (Henry Edwards).

This species is very strongly marked, and readily distinguishable from all its congeners by its delicate, fragile appearance, and the thin lustrous squamation of the wings.

Taken by Mr. Henry Edwards in the early part of July. Mr. Edwards found, during the same visit to the locality mentioned, a single larva belonging to this genus feeding on a large species of sunflower (*Helianthus* ——), which I have little doubt belongs to this species. It was smaller than those of *C. californica*, and more like that of *C. constricta*, but abundantly distinct from either. It came to my hands through the mail in such a condition as not to admit of a careful description. The only trees growing in the region from which this species was received, are various species of willows or conifers.

C. CONSTRICTA, n. sp.

Larva. Head blueish, mottled with black. Body with a moderately broad, irregular, but continuous bright ochreous dorsal stripe bordered with black. Sides blueish white, faintly mottled with black, this color being concentrated into a diffuse lateral stripe just above the lateral bunches of hairs. From the dorsal stripe spring dark tawny hairs, directed upwards, with a few black hairs in the black margin of the stripe. Each segment on its anterior edge has a lateral bunch of white hairs directed downwards, and above the feet there is a continuous line of depressed white hairs. Beneath, the body is smoky. Abdominal legs smoky, testaceous at tips. Length, 1.25 to 1.50 inches.

Varies in the brilliancy of the dorsal stripe and the intensity of the color in the lateral black stripe. Beneath the black stripe there is in strongly marked individuals (usually small ♂?) a faint, pale whitish ochre, broken, slender stripe, and the fold above the feet is of the same color.

The larvæ from which the foregoing description was drawn were late specimens, mostly ichneumonized. They were found May 27, at which time many cocoons were found empty. The cocoon is whiter than that of *C. californica.*

Imago ♂. Entire insect dark cream color with a faint tinge of reddish brown; the front of the head, and thorax beneath, round the head, of a deeper shade.

Anterior wings with a faint, narrow, transverse band, seldom completely defined, but most clearly seen on the costal margin, and consisting of two dark lines, the inner one straight, the outer one diverging from the inner as it approaches the costa, where it is bent sharply inward towards the base of the wing. Space between the lines scarcely darker than the rest of the wing, and about half the width of the terminal space; fringes with faint traces of dark scales at the end of the nervules. Secondaries immaculate.

Beneath, same as above in color, but the primaries have a more decided reddish tinge, and the basal half of the wings, as far as the outer line above, is uniform reddish brown.

♀. Reddish brown above and beneath; primaries above sprinkled with pale scales. Band of primaries more distinct, rather broader, and rather darker than the rest of the wing. Fringes paler.

Expanse of wings, ♂ 1.00 to 1.10 inches. ♀ 1.40 inches; *length of body* ♂ 0.50. ♀ 0.55 inch.

Habitat. Mountainous districts round the bay of San Francisco.

This species is abundant on the black oak (*Quercus Sonomensis*), the larva being full fed about the middle of May. Mr. H. Edwards has raised the species frequently, and it appears to be more constant in its coloration than *C. californica,* which varies quite as much as *C. neustria,* and to be at the same time confined to the mountainous regions where *Q. Sonomensis* is common. It has never been found, so far as I know, close to San Francisco, although *Quercus agrifolia,* the food plant of *C. californica,* is common in that vicinity, from which we may conclude that its range of food is limited, more so indeed than that of the latter species.

C. STRIGOSA. n. s.

♂. Entire insect dark cream color, with a tinge of yellow ochre.

Anterior wings with a moderately wide band, concolorous with the rest of the wing, defined by two rusty lines, straight, somewhat wider apart on the costa than on the inner margin, and both strongly bent towards the base of the wing on the costa. Terminal space about one and a half times the width of the band. Fringes of both wings distinctly interrupted with rusty scales at the nervules.

Beneath, the primaries are suffused with pale rusty scales, and all the wings are crossed by a distinct sinuous reddish brown line, that on the primaries corresponding to the outer dark line above. ♀ unknown.

Expanse of wings ♂. 1.25 inches; *length of body* 0.60 inch.

Habitat.. Yosemite Valley, California. Hy. Edwards.

This may possibly be a variety of *C. constricta*, but I have given it here as specifically distinct because there is no difficulty in separating the imagines, though they resemble each other closely. The question cannot be considered settled, however, until we know the transformations of this species. It differs from *constricta* in the tint of the wings, which is unimportant perhaps, but constant so far as we know (5 ♂ of each examined); also in the proportionate width of the band and terminal space, but chiefly by its uniformly larger size and different coloration beneath.

C. EROSA. n. s.

♀. Entire insect pale, lustrous chestnut brown, with a tinge of ochre on the primaries and thorax. Secondaries rather darker than primaries.

Anterior wings crossed by two very oblique, nearly parallel darker lines; the inner one straight; the outer one somewhat bent towards the base of the wing as it approaches the inner margin. The space enclosed by these lines is wider than the terminal area. Fringes of all the wings dark, same color as the transverse lines. Outer margin of primaries distinctly concave at termination of 4th median nervule.

Beneath, uniform pale lustrous red-brown, fringes darker. The outer line on the primaries above faintly visible.

♂. Similar to ♀ but smaller.

Expanse of wings ♂ 0.95, ♀ 1.40 inches; *Length of body* ♂ 0.40, ♀ 0.65 inch.

1 ♂ 4 ♀ examined. Collected by Mr. Henry Edwards in Oregon. These were raised from larvæ which had been feeding on *Robinia pseudo-acacia*, and which had spun up in a number of leaves drawn together. The larva is yet unknown, but the male of this species is abundantly distinct from the male of *C. distria*, the only species with which it could be confounded.

In addition to the foregoing five species, all of which are undoubtedly specifically distinct, if we except *C. strigosa,* I have before me two other unique specimens which cannot be referred to any of the species herein described. That one of them is specifically distinct, is more than probable from the fact that I am acquainted with a willow-feeding larva belonging to this genus, which is found in California and is different from any species of which the transformations have been recorded, but which appears to be very difficult to raise, and from which I have hitherto been unable to rear the imago. One of these specimens I describe below, under the name of *C. thoracica* ; while the other, being less strongly marked, is retained for future determination. I have also presumptive evidence, founded on dead larvæ, taken from aborted cocoons found in Oregon, of the occurrence of another species, the transformations of which still await elucidation.

C. THORACICA, n. s. (?)

♂.—Entire insect dull red-brown, the primaries rather redder than the secondaries, which are the same color as all the wings beneath. Primaries with exceedingly faint traces of a broad band. Head, thorax and abdomen rather grayer than primaries. Thorax very stout and very hairy, being disproportionately large; abdomen very short and conical.

Expanse of wings 0.90 inch ; *Length of body* 0.40 inch.

Habitat: Congress Springs, San Mateo County, California. (H. Edwards.)

Differs widely from all our other species in the structure of thorax and abdomen, and probably belongs to the larva alluded to above.

C. AMERICANA, Harris, Ins. Inj. Veg., p. 267, (1841).

C. decipiens, Walker ; *Phalœna castrensis,* Smith-Abbot.

Bombyx frutetorum, Boisduval, Ann., Soc. Ent. Belg., vol. 12, p. 82, (1868-9).

Habitat, Eastern States from Maine, (Packard) to Texas. (Belfrage). California (Boisduval).

Boisduval says of this species that " it is common in Canada and of infrequent occurrence in California." So far as I know it has never occurred on this coast.

C. DISSTRIA, Hübner.

Malacosoma disstria, Hübner, Verg. (teste Grote).

Phalœna neustria, Smith-Abbot ; *C. sylvatica,* Harris.

Bombyx drupacearum, Boisduval, Ann. Soc. Ent. Belg., vol. 12 p. 72, (1868-9).

Habitat.—Atlantic States from Maine southward (Packard). California (Boisduval).

Boisduval says of this species " common over a large portion of the United States, much rarer in California." The occurrence of this species in California or even on the Pacific coast of North America is unknown to the writer, neither have I heard of a single complaint from the orchardists of this coast, which would lead to the suspicion that any species of *Clisiocampa* occurred in the orchards, or was likely to be a source of trouble. The occurrence of these last two species in California, as stated by Boisduval, I believe to be the result of errors on the part of his correspondents, though, from what we know of the distribution of other common Atlantic forms, it is quite possible that one or both may occur in British Columbia and Washington Territory, or even as far south as Oregon.

ON SOME SPECIES OF NISONIADES.

BY J. A. LINTNER.

Mr. Wm. H. Edwards has submitted to me for examination some examples of Nisoniades, which prove to be undescribed species. They are the following:

NISONIADES NÆVIUS, n. sp.

Size somewhat less than *N. Juvenalis,* and *N. funeralis.* Wings fuscous, almost black, with a purple reflection.

Primaries with four minute, subquadrangular, white, costo-apical, hyaline spots, of which the fourth (from costa) may be obsolete; a similar spot in cell 3, and none in the discal cell. An irregular umber-brown spot centres on the discal cross-vein, and at about the middle of cell 1 b (the submedian interspace) is another, showing more distinctly in the ♀. The subterminal row of obscure, rounded, intranervuler fuscous spots rest on a dark umber-brown ground. All the markings are nearly lost in the dark ground; those best defined are two confluent trapezoidal spots in cell 1 b, forming the inner termination of the transverse row of spots, and defined without and within by a W in umber-brown. The spots of the transverse row are not of the ordinary sagittate form.

Secondaries dark brown, showing faintly the two rows of intranervular paler brown spots, more distinct in the ♀. Cilia dark brown, lighter upon their outer half in one ♂, and quite pale, approaching whitish in the ♀

Beneath, paler brown, and showing more or less distinctly the two ordinary lines toward the margin of pale brown spots, and in one ♂ example, a white spot in the discal cell, not seen on the upper surface. Head and palpi concolorous with the thorax abdomen and legs.

Expanse of wings: ♂, 1.45 to 1.65 in.; ♀, 1.65 to 1.70 in.

Described from 3 ♂'s, collected at Indian River, Florida.

This species is allied to *N. funeralis* Scudd.-Burg. Its markings are similar in form and arrangement and nearly as inconspicuous, and the pale fringe of the secondaries in one example shows a tendency toward the white fringe of that species. Its wings are not quite as pointed. The examples before me show none of the bluish hairs which sprinkle the primaries of *N. funeralis* and are still more numerous in *N. Juvenalis* Fabr. and *N. Propertius* Scudd.-Burg.

This may possibly be the *N. Terentius* of Scudd.-Burg., based upon the genital armature; but as the differences presented between the genitalia of this species, which have been carefully observed, and those of *N. Terentius* as described and illustrated, are greater than those which have served to separate other of the genitalic species, it would not be proper to accept the two as identical.

NISONIADES PETRONIUS, n. sp.

In ornamentation and general character, allied to *N. Propertius* Scudd.-Burg., resembling it in the quite oblique line of subsagittate black spots crossing the nervules. The black markings of the wings are more strongly contrasted with the dark brown ground than in *N. funeralis* or *N. Nævius*, but less so than in *N. Propertius* and *N. Juvenalis*—about equal to *N. Persius*. The white hyaline spots of the primaries are of medium size—smaller than in the average of *N. Juvenalis*; that in the discal cell is small; that in cell 3 on the transverse line of sagittate spots is crescentic, concave toward the base; below the latter, in cell 2, a smaller white spot, wanting in one example.

Beneath, reddish-brown, especially the secondaries, which show two rows of pale brown submarginal spots which become obsolete before reaching the front margin of the wing, and wholly want the white spots in cells 6 and 7 which characterize *N. Juvenalis* * and *N. Propertius*. The white spots of the primaries are larger than above.

Head: above the eyes and just behind the "locklet" are a few white scales; behind and beneath the eyes are some pale yellow-brown scales, and similar colored hairs compose most of the palpal covering, quite in contrast with the dark brown color of the legs, thorax and abdomen.

A single ♀, accompanying the examples submitted to me, I refer, somewhat doubtfully to this species, from general markings and the pale-colored palpi. The transverse row of ellipsoidal black spots, and those of the medial and basal regions, are conspicuously outlined on a somewhat pale umber-brown ground—the contrast about that presented in *N. Martialis* ♀. An oval white spot in cell 2 accompanies the round one in cell 3. The costo-apical white spot in cell 9 is wanting.

---

* In 45 examples of *N. Juvenalis* before me, these white spots are a prominent feature. In one example, the spot's each occupy the entire breadth of the cell.

Expanse of wings: ♂, 1.90 to 2 in.; ?♀, 1.80 in.

Described from 4 ♂'s and 1 ♀ from Indian River, Florida.

This is the largest species known to us in the genus. It is separable from *N. Juvenalis* and *N. Propertius* by its darker color, less distinct ornamentation, less rounded wings, and absence of the white spots of secondaries in cells 6 and 7. From *N. Nœvius* with which it is associated, it is distinguished by its large size, more distinct markings, and the contrasting lighter shade of the palpi.

The genitalia of this species resemble those given for *N. Horatius* and *N. Virgilius*, named from their genital armature, by Scudder and Burgess, but I am unable to refer it to either. Examples from Florida, which Mr. Scudder has kindly permitted me to examine, and labeled by him as *N. Horatius*, have the white hyaline spots of the primaries larger than in the above species, and, according to notes made at the time of their examination, "larger than in any of the *N. Juvenalis* in my collection, except in a single example taken at Center, in which they are about the same in size and similar in form."

NISONIADES PROPERTIUS, Scudd.-Burg.

Several years ago, through the kindness of Mr. Scudder, I was permitted to examine the species of the Nisoniades in his collection, including several of his types. Among them were eight examples, bearing his label of *Propertius*, from the following localities; two from Mokiah Pass, Palmer collection; one from Sierra Nevada; four from California; one from Juniper Mountains.

The following notes upon this species were made by me at the time, upon comparison of the material with the examples of *N. Juvenals* in my own collection.

Size of *N. Juvenalis;* the primaries more pointed; the submarginal row of sagittate and black spots is more oblique, being more drawn inwardly toward the base as it approaches the internal margin, whence it follows that, while in *Juvenalis*, of the two subelliptical whitish spots in cell 1 b, the lower one is as near to the outer margin as that in cell 3; in this species it is always further removed. The hyaline spot in the discal cell is smaller than in *N. Juvenalis* and is much less conspicuous underneath. Of the four costo-apical hyaline spots, 1, 3 and 4 are in line, or 3 is somewhat nearer to the base of the wing; 2 is nearer the apex and is elongated. The thorax and abdomen are fuscous, instead of umber-brown. In general color it is darker, more approaching *N. Persius*—the black spots not offering so strong a contrast with the ground as in *N. Juvenalis;* the primaries are nearly covered with bluish hairs, which is perhaps the best characteristic feature of the species.

It is very doubtful if the genitalic form, *N. Tibullus* of Scudd.-Burg., can be separated from *N. Propertius*.

This species has also been received from Utah and Arizona. I have also in my collection, examples received from Mr. Henry Edwards (No. 76), from Havilah, California, and Vancouver Island in the Middle and Eastern States.

NISONIADES ICELUS, Lintn.

Mr. W. H. Edwards has allowed me to examine two examples of this species, which he had obtained from the Western collections of Mr. Morrison in 1880, taken in Washington Territory. This extreme western locality for this insect is an interesting addition to our knowledge of its distribution. Mr. Scudder, in his *Systematic Revision of American Butterflies* (1872), gives as its distribution, Canada to West Virginia; Atlantic Coast to Michigan. In the Edwards' *Catalogue of the Diurnals of North America* (1877), its habitat is given as New England, Middle States and Illinois. Subsequently (my *Entomolog. Contrib.*, No. IV., 1878), I identified it among some Colorado collections of Mr. Morrison. These western examples do not differ in size or in any particular feature from our eastern forms. The examples before me are without date of collection. They are in fresh condition, and are rather more strongly marked with white scales toward the costal and outer margins of the primaries than those ordinarily met with.

An interesting feature of this species, observed by Dr. Speyer, is noticed in his valuable paper on the *Genera of the Hesperidæ of the European Faunal-Region* (Canad. Entomol., x. p. 169). It is the presence of a long and thick tuft of hairs on the posterior tibiæ. This is not found in *N. Brizo* Boisd.-Lec.—a species so closely allied to *N. Icelus*, that some writers have questioned their specific difference. It has been observed in but one other species of Nisoniades, viz., *N. Persius* Scudd. It also characterizes the Hesperidean genus Daimia of Murray, of which the European *D. Tethys* Men. is the type and sole species, and Scelothrix of Ramb.—united with Pyrgus H. by Dr. Speyer in his last Revision of the European Hesperidæ (1878), as Group 11, having *maculatus* Brem. as the type of the group. This tuft or hair-pencil differs in the several species. In *N. Icelus* it is produced from the femoral joint of the tibia, and is widely spread apart in the examples before me. In length it exceeds the tibia by nearly one-half. Like the costal-fold, it is probably confined to the ♂ sex.

A revision of the proof of this paper has enabled me to add the following: Since the above was written, an examination of the Nisoniades in my collection has shown the presence of the tibial hair-pencil also in the males of *N. funeralis* Boisd., *N. Nævius* Lintn., and *N. Lucilius* Lintn. I cannot detect it in any other than the above mentioned five species. In the genus Pyrgus, I find it in *P. centaureæ* Ramb., *P. scriptura* Boisd., *P. Xanthus* Edw., *P. Petreius* Edw., and *P. ericetorum* Boisd. It is not present in *P. tessellata* Scudd. Of *P. Oceanus* Edw., *P. Ricara* Edw., *P. Philetas* Edw., and *P. cæspitabis** Boisd., I possess no examples for examination. It exists also in *Achlyodes Thraso* Hübn.

NISONIADES SOMNUS, n. sp.

Belongs to the *N. Icelus* and *N. Brizo* group; size of the former—its wings somewhat narrower and more extended apically.

Male, dark brown in color, approaching *N. Persius*. Primaries, without the anteapical white spot above, and the large patch of bluish-white scales resting on the discal cross-vein of *N. Icelus*. The black transverse bands are of the position and character of those of *N. Icelus*, but are almost lost in the ground color. Secondaries, nearly as dark as the primaries, showing indistinctly the two rows of pale brown spots.

Beneath, wings bronze by reflection. The primaries have a short costo-apical white streak in cell 8 and a minute white dot in cell 9 (*N. Icelus* has usually a subquadrangular white spot in cells 6, 7 and 8 each, and occasionally the spots form a continuous line nearly across the wing, from 2 to 8 inclusive); an intranervular series of pale streaks, and on the secondaries, the two rows of yellow-brown spots are distinct.

Female, paler brown than the male. The two transverse bands of the primaries are quite distinct, and between them, on the discal cross-vein, is a conspicuous patch of whitish scales; no white anteapical spots; upon the margin, a row of rounded brown spots, separated from the contiguous band, by whitish scales. The bands are broader than in *N. Icelus*, and are almost drawn together on vein 2; the connected series of spots composing each, are shaped much as in *N. Icelus*, are heavily bordered with black, and bear bluish scales. Secondaries, with a geminate discal mark, a submarginal row of yellowish spots much bent inwardly opposite the cell, and a marginal row of small, linear, whitish spots.

Beneath, wings with a strong bronze reflection. The secondaries have the two rows of spots of the upper surface repeated; the primaries have a marginal row of linear whitish spots, a regularly curved submarginal row of eight oblong yellowish spots, and a single white anteapical spot in cell 8.

The antennæ, in this species, are delicately annulated with white. The palpi are shorter than in *N. Icelus*, shaggy, some of the hairs of the second joint extending to the tip of the third. The tibiæ of the posterior pair of legs are without the pencil of hairs characterizing *N. Icelus*.

---

*Erroneously given as Cæspitatis in Edwards' Catalogue.

The last mentioned feature, separates beyond question, this species from *N. Icelus.* It may also be distinguished by the darker and more uniform color of the male, the transverse bands hardly separable from the ground color, the absence of an ante-apical white spot and of the discal patch of bluish scales. The female resembles *N. Brizo,* but the inner margin of the outer band is much more irregular than in that species, and the submarginal row of spots on the primaries beneath, takes the place in prominence, of a different series seen in *N. Brizo,* of which only the costal one is here represented.

Expanse of wings: ♂, 1.30 inch; ♀, 1.45 inch.

Described from 1 ♂ and 1 ♀, in the collection of Mr. W. H. Edwards, received from Indian River, Florida.

The relationship of this species, suggests the mythological name given it. BRIZO was worshipped as the goddess of sleep. ICELUS was regarded as the inspirer of dreams in mortals, and was the son of SOMNUS, the god of sleep (See 23 *Rept. N. Y. St. Mus. Nat. Hist.*, 1873, p. 163-4).

EUDAMUS PROTEUS (Linn).

Quite an interesting addition to the list of Hesperidæ, occurring in the State of New York, is the above species.

Two examples of it, one of which I have been permitted to see, were captured by Mr. S. Lowell Elliot, of New York City, about the middle of August of last year, in the Central Park Gardens, east of the Mt. St. Vincent Art Gallery, upon the flowers of *Salvia splendens.* Other examples of it, as Mr. Elliot informs me, were seen by him, which he was unable to capture, for as soon as they alighted they were attacked by *Eudamus Tityrus,* which swarmed around these flowers and seemed to recognize the *Proteus* as strangers and intruders.

The species was not observed about other flowers, but were seen hovering around the *Salvia* for three consecutive days, when a cold rain storm ensuing and continuing for several days, terminated their visits.

Scudder reports the species from "Eastern N. America, as far north as Connecticut," but we have not been able to verify its collection in that State. We believe that these are its first captures within the State of New York.

EUDAMUS NEVADA, Scudd.

From an example received from Mr. Henry Edwards, No. 2509, Summit Sier. Nev., Cal., and from an additional example collected by Mr. Nash, of Ithaca, in Colorado, I find that the above form is a valid species, quite easily to be separated from *E. Pylades,* of which, at the time of the publication of the Edwards' *Catalogue of the Lepidoptera of America-Diurnals,* it was believed to be a dwarfed variety.

NEW WESTERN MOTHS.

By A. R. Grote, A. M.

Thyatira Lorata, n. s.

Forewings ashen brown, shaded with white over median space, superiorly and about a deep brown triangular shaded blotch, which marks the inception on costa of the subterminal line. A basal white median patch, edged with black and stained with pink. Median lines distinct, black, single, approximate, approaching inferiorly; t. p. line followed by black venular marks. Stigmata small, near together; reniform upright, subovate: orbicular, round. A reddish patch at internal angle, edged within with white. A narrow waved apical streak. Hind-wings yellowish fuscous, with sinuate mesial shade and reddish fringes. Thorax light brown; sides of tegulæ whitish; beneath dull yellowish fuscous with double sinuate shade bands emanating from two costal dark brown or blackish marks on fore-wings. Head and collar deep brown.

Expanse 40 mil. Washington Ter., coll. Mr. B. Neumoegen.

At once distinguished from our Eastern *Pudens* by the broader primaries, with their black propinquitous median lines, the absence of the apical patch and the subterminal dark costal blotch, while the costal region at base is equally dark, the stigmata complete; the reniform a little reddish; the basal patch is notched superiorly and less extended than in *Pudens*.

Bombycia Semicircularis, n. s.

♀. Eyes naked; head sunken; a tuft on the third abdominal segment; wings broad. Primaries with a basal creamy patch; black edged, pointed on the s. m. fold. Beyond is a broad transverse anterior shaded band, made up of three or four black lines with the spaces between them black-shaded. The ground color of the wing is hoary gray. A second vague black band, made up of two or three lines, crosses the wing beyond the disc and approaches the first on submedian fold. Median space dark gray; stigmata approximate, not very noticeable, concolorous, the reniform with blackish centre; the orbicular reduced, round. A black festooned line below apices inaugurates the s. t. line, somewhat as in *Thyatira Lorata*, but the first curve is obsolete, the line appearing along external margin below the tip; it is discontinued below vein 6. Hind wings yellowish gray, with an inner broad and diffuse band, beyond which the wing is narrowly paler before an indistict outer line. Beneath yellowish gray with double bands, the inner very broad; tegulæ whitish with brown tips; head and collar dark.

Expanse 40 mil. Washington Territory, Coll. Mr. B. Neumoegen.

This specimen is more sombre than *B. Improvisa*, Hy. Edw., and wants the yellowish green patches and rosy markings.

In *Semicircularis* the anterior black band is nearly evenly arcuate, it is waved in *improvisa*, and notably drawn in at submedian fold. There is a black dot on the cell near the t. a. line, marking the orbicular in *improvisa*, wanting in *semicircularis*. The apical streak is more continuous and waved in *semicircularis*. The basal patch is extended to the internal margin in *improvisa*, but in *semicircularis* it is confined to the middle of the wing much as in *Thyatira*.

NOLA FUSCULA, n. s.

♂ Allied to *Minuscula*. Antennæ bipectinate. Gray. Head and collar whitish, the latter with a fine black line. Primaries fuscous gray; median space darker shaded before the t. p. line. Inner line black, fine, roundedly produced at median vein. Outer line preceded by a faint coincident line; the t. p. line itself is roundedly produced opposite the cell, running inwardly below median vein, thence arcuate to internal margin. S. t. line indicated by a diffuse dark shade. Hind wings soiled whitish. *Expanse*, 25 mil. Colorado. This species is larger than *Minuscula*, from Texas, which it otherwise much resembles. The forewings are darker, the hind wings paler.

AGROTIS HAVILÆ, Gr. B. U. S. G. S., vi., 157.

A number of specimens collected by Mr. Morrison in Southern California leave no doubt on my mind that the species is distinct from our Eastern *Clandestina*. The general color is paler. The head and thorax more decidedly brown; the t. p. line is followed by whitish points, the line itself more strongly dentate; the hind wings are more uniformly fuscous. In fresh specimens the paler marks forming the t. p. line, and the edges of the stigmata and t. a. line have a whitish cast.

AGROTIS CLODIANA, n. s.

♂ All the tibiæ spinose; fore tibiæ with longer terminal spines. Eyes naked. Antennæ brush-like. Allied to *Gravis*, but without the distinct stigmata. Forewings of a curious purplish brown, with a shading of yellowish. Orbicular small concolorous, round, with a paler yellowish annulus; reniform concolorous, transverse, moderate, ringed like the orbicular. Claviform indicated, small median shade, blackish, diffuse. Lines illegible; fringes with a narrow, pale yellowish line at base. Hind wings pale, soiled with fuscous along the margins. Head and color russet brown, collar with a pale line above a deeper shade; thorax mixed pale and brown. Beneath fore wings dark; hind wings pale, with discal marks and faint common line. *Expanse*, 38 mil. Washington Territory.

A female specimen, also collected by Mr. Morrison, probably belongs here. The fore wings are entirely obscure yellowish brown, with the markings lost.

HADENA CINEFACTA. n. s.

♀. Eyes naked; tibiæ unarmed. Abdomen with a series of small abdominal tufts. Gray over ochrey or olive fuscous. The species has a resemblance to *Mamestra Distincta*, but differs generally by the naked eyes. T. a. line much projected outwardly below median vein; claviform pale, outlined in black, its inferior margin a black streak in sub-median fold connecting the two lines. A fine black basal ray. Orbicular outwardly oblique, pale, moderate; reniform upright, nearly concolorous. Median space tinged with olive ochrey; basal and sub-terminal fields gray; terminal space olive fuscous. The M-mark of sub-terminal line is well written, preceded by three cuneiform dark marks before the s. t. line itself. Fringes dark, cut with pale opposite the veins. Hind wings fuscous. Thorax gray, with olive fuscous lines on collar and tegulae. Beneath the wings are grayish fuscous with faint common line and obscure discal dots on secondaries. *Expanse* 35 mil.

Washington Territory. Coll. Mr. B. Neumoegen and Mr. Hy. Edwards.

MELICLEPTRIA HONESTA. n. s.

Allied to *Oregonica*. Fore wings with the basal field, the stigmata and the sub-terminal space dark olive, somewhat golden sericeous. Median field light yellow, narrow, the yellow color obtaining narrowly between and about the spots and obtaining inferiorly except along the t. a. line which is followed by an olive shade below the median vein. Sub-terminal line pale yellow, narrow, twice indented. Hind wings black with the discal lunule absorbed by the basal field and its lower end intruding on a mesial white band; the black border shows an oblique series of small pale spots between the median nervules. Beneath, grayish white; on fore wings the stigmata, sub-terminal space and a basal streak along internal margin black; on the hind wings the border is black about anal angle and the discal lunule is tinged with black. *Expanse* 23 mil.

Mount Hood. Oreg. Coll. Mr. B. Neumoegen.

TRIOCNEMIS. n. g.

A noctuid genus from south California allied to *Heliothis* and *Chariclea*, differing by the flattened fore tibiæ which have a broad, rounded exterior projection, a very long stout spine near the inner margin, and a short spine at the extremity of the inner edge. Eyes naked; ♂ antennæ simple. Thorax with discolorous posterior tuft. Abdomen untufted.

TRIOCNEMIS SAPORIS. n. s.

White: Head and thorax white, with a brownish tuft behind on the thorax. Band of forewings white, bounded by the t. a. line, which makes a sharp sub-median projection and a slight notch on s. c. vein. Median space blackish; the stigmata indicated by white inner ringlets or anterior shades. T. p. line much exserted superiorly, running in opposite the dentation of the t. a. line. S. t. space narrow, white, with a black costal shade and some cuneiform marks at the middle. Terminal space, and fringes leaden gray; terminal line a succession of white streaks. Hind wings fuscous, paler within a narrow median white band. Beneath, with markings reflected. *Expanse* 27 mil.

Washington Ter. Coll. Mr. Hy. Edwards and Mr. B. Neumoegen.

DESCRIPTION OF A NEW HESPERIAN FROM FLORIDA.

BY W. H. EDWARDS.

PAMPHILA STRATON.

Male.—Expands 1.5 inch.

Upper side dark brown, marked and spotted with reddish fulvous; three small spots in subcostal interspaces of primaries, two others opposite cell and towards hind margin; and in line with these an oblique row crossing the median interspaces, the lower spots merged in the fulvous of disk which extends to base and anteriorly to costa; the stigma in two sections, the anterior one completely crossing the lower median interspace; a narrow smooth black slightly bent ridge; the lower one in sub-median interspace, parallel to the line of the other; short, not reaching either nervule; behind the stigma is a narrow blackish rough patch. Secondaries have the disk obscure fulvous, with an imperfectly defined series of spots on the anterior half of the wing; fringes of primaries fuscous next the margin, whitish outside; of secondaries fuscous next margin, then fulvous, and outside whitish.

Under side of secondaries bright ferruginous of one shade and immaculate; apex of primaries bright ferruginous; the hind margin a little obscured, the spots indistinctly repeated, next base and against stigma black.

Body above black, covered with fulvous hairs, thorax below yellowish, abdomen same with a fulvous tint; legs fulvous, palpi light yellow with fulvous tint; antennæ black above, yellowish below; club black on both upper and under surface, on the sides fulvous.

Female.—Expand 1.6 inch. Color dark brown; primaries have spots placed as in the male, distinctly defined throughout, the basal area being brown, instead of fulvous as in male. Secondaries as in male. Under side as in male, but on the disk of secondaries is an indistinct bent row of small paler spots corresponding to the spots of upper side.

From 3 ♂ 1 ♀ received from Indian River. The male is very like *Leonardus* on upper side, with the stigma of same peculiar character, and in this respect these two stand alone among

American species so far as known to me. So the clubs of the two are precisely alike. But on the under side there is a departure from *Leonardus*, which has distinct spots on secondaries. In color and lack of spots *Straton* resembles *Arpa.*

A NEW SPECIES OF ANTARCTIA FROM MOUNT HOOD, OREGON.

By B. Neumoegen.

ANTARCTIA RUBRA. n. sp.

♂ Head and thorax remarkably pilose and of bright blood orange color. Head prominent, thorax very stout, abdomen of short, conical structure, less hairy, and of lighter color. Antennæ prominent, of same color as head and thorax, with black, even pectinations. Legs concolorous with thorax.

Primaries chocolate color with a reddish underground. Fringes orange color intermixed with brown. No special markings, except a small blackish discal spot, hardly perceptible.

Secondaries smoky black with orange tinted, bright fringes, and a diminutive black discal spot.

Beneath, primaries as well as secondaries reddish brown, fading into a lighter, whitish shade towards base, and fringes of a prominent reddish tint. Discal spots in primaries and secondaries, well marked in black.

♀.—Larger than male. Antennæ, palpi, head and thorax, less hairy and concolorous with primaries. Antennæ slender and smooth. Abdomen prominently formed, of yellow reddish shade.

Primaries of strikingly vivid color, being the true blood orange tint, with a somewhat darker, hardly noticeable discal spot. No other markings. Fringes of same color.

Secondaries of smoky black with blood orange fringes. A very small, black discal spot.

Beneath, primaries and secondaries orange-colored, fading towards base. The discal, blackish spots well marked in both wings. Fringes concolorous.

Expanse of wings, ♂ 1 1-10 inches; ♀ 1½ inches.
Length of bodies, ♂ ¼ inch; ♀ ⅜ inch.
Habitat: Mount Hood, Oregon.

Having convinced myself that I had not to deal with the red California variation of A. punctata, Pack., which, by the way, occurs only in the female form, I decided to study Boisduval's description of California Arctians, especially A. rufula, before pronouncing on the present species. I came to the conclusion that A. Rufula, Boisd., ♂ (vide Lepid. de la Californie, p. 80.) is nothing but one of the numerous varieties of A. vagans, Boisd., while the ♀ A. rufula is but the reddish form of A. punctata, Pack.

A. rubra, therefore, proves to be a beautiful addendum to the hitherto described species.

Collected by Mr. H. K. Morrison, season of 1880.

Types ♂ ♀, collection B. Neumoegen. The type of ♀ kindly presented to me by Mr. A. R. Grote.

A NEW GENUS AND SOME NEW FORMS OF NORTH AMERICAN ZYGÆNIDÆ.

By Hy. Edwards.

Penthetria. Hy. Edw. Nov. gen.

Similar to the Fabrician genus Procris, but differing in having the antennæ slender and non-pectinate in both sexes. The abdomen, too, is without the anal tuft in the female. The genus Procris, as originally indicated by Fabricius, included Ino. *Leach* and Aglaope. *Latr.*, and it is doubtful if we have any true representatives of either in the United States fauna, the species recognized by Harris under the name of Procris having been, by common consent, placed in Acoloithus and other genera.

Penthetria Majuscula. Hy. Edw. n. sp.

♂. Greenish black throughout, with a metallic lustre, wanting along the costal edge of secondaries. Abdomen with the anal segment golden yellow.

Exp. wings, 0.90 inch. Georgia. H. K. Morrison. Type. Coll. Hy. Edwards.

♀. Similar to the ♂, but a trifle larger and with the anal seggent of the abdomen concolorous with the rest of the body. Type. Coll. F. Tepper.

Penthetria Parvula. Hy. Edw. n. sp.

Primaries smoky black, with purplish reflections, rather darker about the margins. Secondaries smoky, semi-transparent. Thorax, abdomen, legs, and antennæ concolorous. Under side similar to the upper.

Exp. wings, 0.60 inch.

1 ♂. Indian River, Florida.

1 ♀. Georgia.

Types. Coll. Hy. Edwards. F. Tepper.

Gnophæla vermiculata. G. & R.

n. var. Continua. Hy. Ed.

A form of *G. vermiculata*, probably common, in which the cuneiform whitish patches of the primaries and the sub-marginal spots are joined together, the whole central portion of the wing being thus sub-diaphanous, exeept a large costal patch behind the cell. In the typical form, a broad band of black crosses the wing, clearly dividing the whitish spaces.

2 ♀. Colorado.

Type. Coll. Hy. Edwards.

LYCOMORPHA CONSTANS. Hy. Edw. n. sp.

Smaller than *L. pholus*. Primaries bright orange, with narrow marginal border of black, widest at the apex. Secondaries black, with narrow costal margin of orange. Antennæ black. Thorax black on the disc, the outer margin orange. Abdomen black. Tibiæ whitish. Tarsi black.

Exp. wings 0.70.

Prescott, Ariz. W. Howard.

Type. Coll. Hy. Edwards.

At once distinguishable from *L. pholus* by the narrow margin of the primaries and the almost wholly black secondaries.

LYCOMORPHA DESERTUS. Hy. Edw., n. sp.

♂. Closely resembling *L. pholus*, but with the black margin of the primaries narrower, though not so narrow as in the preceding sp. It is broadest on the apex, and its inner edge is oblique as in *L. pholus*, while in *L. constans* it is rounded inwardly. The black margin of secondaries is also narrower than in *L. pholu*, and does not curve upwards to the base along the anal margin as in that species. The larger portion of the wing is thus orange. Abdomen, antennæ and tarsi black. Palpi and base of tibiæ orange.

Exp. wings. 0.75 inch.

♀. Much larger than the ♂, with the primaries orange, a broad, black transverse band crossing them near the base and another from costa to the termination of the internal margin, thus leaving the apex orange. Secondaries as in the ♂. Thorax and abdomen orange, above and below. Tibiæ and tarsi orange. Antennæ blackish, paler at their base.

Exp. wings. 1.25 inch.

Underside, the same as the upper, in both sexes.

1 ♂. 1 ♀. Tucson, Arizona. W. S. Edwards.

Types. Coll. Hy. Edwards.

The examples of this singular species reached me in copulation, or they would have suggested different species, if not distinct genera. They, as well as the previous species, seem to exhibit the richness of the insect fauna of the little known region from whence they come.

NOTES ON THE LARVÆ OF SOME MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

ARCTIA DECORATA, Saund.

On page 182 of the 7th Illinois State Entomologist's report, I gave a brief description of the larva of this moth under the name of *Arctia Phalerata*, Harr. I had reared several specimens, all of the imagines having the prevailing black color of both primaries and secondaries of *Decorata*, with the red in the secondaries peculiar to that form, but at that time I regarded it as only a variety of *Nais* or *Phalerata* of Harris, and for that reason put it in the report in that form. Since that time I have bred several others and finding the markings of the imagines to be rather constant, I think the description, brief though it may be, should be credited to *Decorata* instead of *Nais*. In this I do not wish to decide whether *Decorata* is a good species or only a variety, but leave that for future investigation. In either case the larvæ will probably be found to differ. I shall endeavor to make more extended observations on them this season. The description referred to is: "A black, hairy caterpillar an inch or more long, with transverse rows of wart-like tubercles, from which spring spreading tufts of short white hairs. Along the dorsum is a line of pale yellow, sometimes almost white." Like the other Arctians it is a very general feeder.

CYMATOPHORA PAMPINARIA, Guenee.

In his book on Geometrid moths Dr. Packard gives the color of the larva of this as "pale yellowish color, with a broad reddish brown stripe, edged with black on the back." Last fall I found several of them. Some were of the yellowish green color above, others gray and others brown. Packard speaks of pear leaves being their food. I found them feeding on willows and cultivated geraniums. Two of them pupated September 16th and October 2d. Both of these hatched April 17th of this year.

NOTICE TO SUBSCRIBERS.

It was the intention of the Publication Committee to issue Mr. W. H. Edwards' paper on Pieridæ for the present number, but the plates for illustration have not yet arrived from London, and the article in question must therefore be delayed until June.

ERRATA.—On page 43, April No., line 15, for grayish, read yellow; line 5, for Perdiceas, read Perdiccas; page 44, line 8, for Perdiceas, read Perdiccas.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] June, 1881. [No. 6.

ON PIERIS BRYONIÆ OCHSENHEIMER, AND ITS DERIVATIVE FORMS IN EUROPE AND AMERICA.

BY W. H. EDWARDS.

The species, of which *Bryoniæ* is one of the forms, is known as *Napi*, Linn, and is seasonally polymorphic, having in Europe three manifestations, *Bryoniæ*, *Napi* and *Napææ*. The last of these was until recently regarded as a distinct species, or possible species. Westwood, in 1848, is uncertain of the position of *Napææ* Esper, but thinks it is probably a variety of *Napi*, and remarks that "neither caterpillar nor chrysalis have been observed, nor have any circumstances connected with the time or place of its appearance been given," and quotes Stephens as saying: "I think with Godart that it may only be a very large variety of *Napi*, but as it appears to have characters sufficient to constitute a distinct species, the determination of this point must be left for future investigation." Brit. But., Humphreys-Westwood, *Napi*. Boisduval, however, Spec. Gen. I, 518, 1836, had given the species as: *Napi* Linn.; "common throughout Europe and Siberia during summer."

Var. A. *Napææ*, "Common in the autumn."

Var. B. *Bryoniæ*, "Alps" &c.

Dr. Aug. Weismann, in his Studien zur Descendenz Theorie, part 1, Leipzig, 1875, gives excellent colored figures of these three forms in both sexes, and the plate is repeated in the English translation, "Studies in the Theory of Descent," London, 1880. In the text, Lond. ed., page 39, Dr. Weismann says of *Bryoniæ:* "This is, to a certain extent, the potential winter form of *Napi*. The male exactly resembles the ordinary winter form (*i.e.*, *Napi*, Esper) in the most minute detail, but the female is distinguished from *Napi* by a sprinkling of grayish-brown scales over the whole of the upper side of the wings. This type, *Bryoniæ*, occurs in polar regions as the only form of *Napi*, and is also found in the higher Alps, where it flies in secluded meadows as the only form, but in other localities less isolated it is mixed with the ordinary form of the species. In both regions *Bryoniæ* produces but one generation a year, and must then, according to my theory, be regarded as the parent form of *Napi*." On page 44; "In the Alps and Jura, the ordinary form of *Napi* swarms everywhere from the plains towards the habitat of *Bryoniæ*, so that a crossing of the two forms may occasionally or even frequently take place; and it is not astonishing if in some places, Meiringen for example, a perfect series of intermediate forms between *Napi* and *Bryoniæ* is met with. That crossing is the cause of the great variability of *Bryoniæ* in the Alpine districts is proved by the fact that in the Polar regions this form 'is by no means so variable as in the Alps, but judging by about 40 to 50 Norwegian specimens, is rather constant. My friend, Dr. Staudinger, who has twice spent the summer in Lapland, thus writes in reply to my question. A crossing with *Napi* cannot there take place, as this form is never met with, so that the ancient parent-form *Bryoniæ* has been able to preserve its original constancy."

Dr. Weismann, page 40, relates how he obtained eggs from a female *Bryoniæ* in June in a secluded Alpine valley, and subjected the pupae therefrom to a high temperature in a hot-house, but only one butterfly emerged the same summer, in spite of this high temperature, and of what he regards as of more special importance, in spite of the want of cooling at night, and that this was a male *Bryoniæ*. "The other pupae hibernated in the heated rooms, and produced from the end of January to the beginning of June, 28 butterflies, all of which were exquisite *Bryoniæ*. Experiment thus confirmed the view that *Bryoniæ* is the parent form of *Napi*, and the description hitherto given by systematists ought therefore properly to be reversed. Pieris *Bryoniæ* should be elevated to the rank of a species, and the ordinary winter and summer forms should be designated as vars. *Napi* and *Napææ*."

Boisduval describes *Napi* (*i. e.*, the ordinary winter form) thus: "Wings white, with the base a little ash-colored. Primaries have the apex and ordinarily the extremities of the nervures black; the disk *sometimes without spots in the male, and sometimes with one black spot, as in Rapæ*; in the female *ordinarily two spots and a black stripe situated as in the female of Brassicæ and of Rapæ. Secondaries have a black spot on costal margin.* Under side of primaries white, with *two black spots as in the allied species*, the apex yellow; under side of secondaries of a pale yellow, with veins of blackish-green covering the nervures." Westwood says: "The males *generally have a black spot* between the middle and apex of the wing (primaries); the females have *two large black spots* towards the posterior margin, the *hinder one being connected* *with a black dash on the inner margin;* on the under side the males have *two black spots* corresponding with those of the females."

Napææ, Westwood says, is of a larger size than the ordinary specimens of *Napi*, and, quoting from Stephens: "The male has the upper surface milk-white, with the tip, a spot, and two or three triangular dashes on the hind margin of the anterior wings black; *beneath two cinereous spots;* the posterior wings are pale yellowish, *with a deeper costal streak*, the basal nervule above (*i. e.*, towards costa) dilated and greenish. The female has the tip of the anterior wings *and three spots*, one of which is subtriangular, and placed on the thinner edge of the wing (the inner margin) black or dusty, and the posterior wings are clearer yellow."

Boisduval says briefly (Spec. Gen. 1,519): "*Napææ*. A little larger than *Napi;* the under side of secondaries shows only some short dusky veins extending from base to end of cell, but only towards costal margin."

Humphreys-Westwood figure and describe a small form, *P. Sabellicæ*, thought by Stephens and others to be a distinct species, described as having the veins on each side strongly margined with brown, "dark margins of the veins both on upper and under surface," but they give reasons for regarding it as a variety of *Napi*. Boisduval, in Spec. Gen., says nothing of this form, and Staudinger's Catalogue makes no mention of it. So that it would seem to be an occasional aberration, and, from the description, resembles some of the American varieties. I only know this *Sabellicæ* from H.-W., and I find in the catalogues of Kirby and Staudinger no reference to any other named variety of *Napi*. Whether *Sabellicæ* is an offshoot of the winter or summer form is not said.

Dr. Weismann sent me 1 ♂ 3 ♀ labelled "summer generation, *Napææ*, taken 30 June." The females have a large pale black apical patch, *three large deep black spots beyond cell*, the upper one partly concealed by the paler apical patch, and on costa of secondaries is a *fourth black spot* nearly as conspicuous as either of the others. On the under side are *two large black spots* on fore wing corresponding to the lower two of upper side, the upper spot of that side not being repeated. *The spot on secondaries is repeated.* Under side of secondaries pale yellow, the nervures next base bordered with brown scales most heavily on the costal side. The male has the tip largely pale black, and but one spot on fore wing, another on costa of secondaries. Beneath, primaries have *two spots:* secondaries are pale yellow, with a *deeper yellow edging to costa from base to outer angle.* I have another male which *has two spots* on upper side of primaries and a *black dash along inner margin.* This also has the *yellow edging* spoken of.

These are therefore the three forms under which the species manifests itself in Europe, *Bryoniæ*, *Napi*, *Napææ;* of which *Bryoniæ* may be considered the parent-form, true to its type in those regions where the climate allows of but one annual generation. But in some localities, as remarked by Dr. Weismann, it is intercrossed by *Napi*, and there must be localities where two generations find existence, made up of *Bryoniæ* and *Napi* more or less intercrossed. But generally, in districts not Arctic or Alpine, the species is represented only by *Napi*, which then is the first or winter generation and *Napææ*, the later or autumnal generation.

Now let us see how the corresponding American species agrees with the European, and wherein it has come to differ.

I. BRYONIÆ. *Bryoniae* of the Arctic and Alpine type is found in America. I have seen several examples from Behring Straits, Alaska, and as they are of one type, I conclude this must there be the only form of the species. The male is white, the bases of all wings much covered with black scales; so is the costa of primaries, especially against cell and base. The apex is usually more or less blackened, and sometimes the hind margin for half its course has black about the ends of the nervules. So have the ends of the nervules on secondaries. Sometimes there is a black spot in the upper median interspace of primaries. Beneath, the hind wings are either white or faintly yellow-tinted, and the nervures and their branches are all heavily bordered with gray-brown, more heavily than any Alpine *Bryoniæ* which I have seen; (Lapland examples I know only from description); the apex of primaries is often yellow and the nervures and branches edged with brown also, but much less than on secondaries.

The female has a much crocked upper surface, the gray sometimes covering primaries almost to the exclusion of white; on secondaries the nervures and branches are all heavily bordered with gray; of four examples before me, three have a black spot in upper median interspace, another in sub-median, and in two there is a third spot in line with these near costa. The inner margins of the three are also bordered with black. The fourth example has neither spots nor border; on the costal margin of secondaries is a black spot. The under side varies from pale to deep yellow, and the fore wings of the three show the black spots, but not very distinctly. (I find the same variability in these spots in *Bryoniæ* of Europe). The Alaskan examples are all small, expanding about 1.5 inch; one ♀ 1.6 inch.

From Newfoundland, Mr. Mead brought many *Bryoniae*, all of large size, expanding 2 to 2.2 inches. The male (of a pair sent me) is white, the female pale yellow on upper side; the female not so much crocked as some European examples, but very like others, the nervures of upper side not quite so much bordered with gray as in the Alaskan examples. On the under side, like these last, the nervures and branches are all heavily bordered with dark gray-brown, much more than in any of my Alpine *Bryoniae*. Probably Lapland examples would show this same heavy veining. Mr. Mead writes: "The dark winter form (*Bryoniae*) was caught during the last week in July (in Southern Newfoundland), but nearly all were more or less battered, and many caterpillars were nearly full grown at that time." This would make the first appearance of the early butterflies about 1st July, or last week in June. From these caterpillars Mr. Mead obtained several chrysalids, about 50 per cent. of which gave imagos between 15th and 20th August, the duration of the pupa period in such cases being about two weeks. The remainder have over-wintered. I have received from Mr. Mead 1 ♂ 2 ♀ which so emerged in August. These are of as large size as the parent-form, the ♂ measuring 2.2 inch, the two females 2 inches. The females at first glance look like ♀ *Venosa*, and in the clouding and the spots of upper side come very close to a female from Vancouver's Island. They are yellow on both sides like that, but the apical patch is more continuous, and the nervures on upperside are not edged gray. Beneath, the nervures of primaries are scarcely more gray than specimens of *Oleracea œstiva*, the few scales that are present being on subcostal and median inside the cell; secondaries are moderately edged from base to end of cell, and on the nervures the scales diminish regularly to the margin.

The male is white as *Oleracea*; no black veins on upper side; a pale gray apex to primaries, and a little black at bases of wings. Below, light yellow, immaculate, the scales as in the females.

Now clearly this form is not *Venosa*. It is the summer generation in Newfoundland; *Venosa* the winter generation in its territory. But this is between *Venosa* and the summer form of same, *Pallida*. I call it ACADICA.

Evidently, in Newfoundland there is one annual generation and a partial second generation, and the existence of the species there must mainly depend on the early chrysalids which overwinter. A favorable long summer would allow the larvæ of the second brood to go to chrysalis, but a short or cold summer would not. And, as has been observed in the case of other species of butterflies in northern regions, nature has made provision against extinction by carrying part of the chrysalids of the early generation over to the next year. This partial second generation in Newfoundland has developed a form not seen on the main land, where we find the well-defined winter form, *Venosa*, and its equally well-defined summer generation, *Pallida*. *Acadica* lies between these two, and is yet a summer form.

Of the intervening country between Northern Alaska and British Columbia we know nothing, and therefore cannot say where *Bryoniæ* becomes digoneutic, and *Venosa* comes in. But in British Columbia and Vancouver's Island we know that *Bryoniæ* has disappeared, and *Venosa,* which is the equivalent of *Napi,* is the winter form, succeeded by a summer form *Pallida,* and the species manifests itself mostly under these two forms to its southern limit on the Pacific Coast.

Except from Alaska and Newfoundland I know of no other *Bryoniæ* having been taken.

Pieris *Hulda* I consider a modification of *Bryoniæ.* When my Catalogue was published, 1877, I had not seen *Bryoniæ* from Alaska, and did not know that it existed on this continent, and I regarded *Hulda* as the extreme arctic type of *Bryoniæ* and its American representative. All the examples of *Hulda* known to me (about 25) came from Kodiak Island, and there is probably something in the climate or food or insulation which has tended to produce this dwarf form. Both sexes expand from 1.2 to 1.3 inch, but one female is 1.5 inch. The males are white on upper side, the apical nervules edged with gray. Beneath, both sexes are alike, the color varying from white to pale and deep yellow; *and all nervures and branches are so broadly edged with ashy-brown that very little of the ground is seen, only in stripes in middle of the interspaces.* I have seen no European *Bryoniæ* whose under surface is anything like so much obscured as these *Hulda.* Three females out of four have the *nerves of upper side bordered with same brown and in same manner as beneath,* the white ground being thereby reduced merely to lines and stripes, and these examples have no spots in the interspaces like the typical ♀ *Bryoniæ.* The fourth example is a little less obscured, and has a dusky spot in submedian interspace only, and the inner margin is bordered dusky, in these respects approaching *Bryoniæ.* As stated above, the fourth Alaskan *Bryoniæ* is without spots, and therein it approaches *Hulda.* I believe *Hulda* to be the first American departure from the European type of the species. At any rate, if this form is Asiatic, as it should be, if found at all in the old world, I have no information of it. It seems as yet to be strictly American.

2. VENOSA, Scudder. This form is described as having "the extremities of upper *nervures broadly margined with black scales, with a spot of same color in the upper median interspace, a black dot at the tips of the nervures on secondaries.* The female differs from the male in having nearly all the *nervures on upper side of primaries somewhat bordered with grayish scales, but most characteristically by the presence of a band of grayish scales along the posterior border of primaries. Beneath, as in the darker forms of Oleracea,*" (i. e. *hyemalis*). This describes one phase of *Venosa* ♂, and probably the prevailing one; but some males have no spot on primaries. I have seen no male *which had any spot on primaries beneath, or on costal margin of secondaries on either side,* points which are characteristic of *Napi* (or what Dr. Weismann calls "the ordinary winter form)." The *Venosa* ♂ which are immaculate above,

are nearest *Oleracea hyemalis* ♂, but the nervures are blacker in the former, and the costal margin of primaries is more extensively bordered black. *Venosa* ♀, so far as I know it, has a second spot not mentioned by Mr. Scudder, the one in sub-median interspace, as seen in *Napæ*. In this sex also my examples *show no spot beneath on either wing*, but all have a gray patch on upper side of secondaries on costa. A large percentage of female *Venosa are yellow on upper side*, another departure from the European type of *Napi*.

Comparing *Venosa* ♂ with European examples of *Napi* (winter form) sent me by Dr. Weismann, I find no tangible difference *except in the presence of the two spots on the under side of primaries and the costal patch on secondaries, which is seen on all the Napi.* All the *Napi* have one spot on primaries above, either distinct and black, or a cluster of black scales, and all have a patch on secondaries on both sides. These differences seem to be persistent, and indicate a departure in the American type. The females of the two forms differ also by the *presence of the two spots beneath* (*Napi*), *or in their total absence* (*Venosa*).

Venosa is the winter form in British Columbia, Vancouver's Island, Oregon, Washington Territory and California, and in all that region it is followed in its second generation by the summer form *Pallida*, Scudder. In the middle of the continent and to the eastward another winter form has replaced *Venosa*, viz.; *Oleracea hyemalis*. But not absolutely, for I have from Quebec a ♀ not differing in any particular from *Venosa* ♀ of Vancouver's Island. But this occasional appearance is probably owing to reversion.

Dr. Boisduval, Lep. de la Cal., p. 38, says of *Nasturtii* ♂, described as a Californian species: "Is this Pieris an American modification of our European species or a variety of *Oleracea?* It resembles much our *Napi*, from which it does not greatly differ, except that beneath the ground is less yellow, with the nervules more largely dilated . . . . and finally *because the two black spots of the upper side do not appear below.*" This is *Venosa* ♂, resembling *Napi*, as I have before said, except in wanting these spots.

3. OLERACEA. The primary form throughout the polar regions of both continents being *Bryoniæ*, in the next generation there has come to be a divergence, some characters being present in the European (*Napi*) which are not found (or rarely if at all) in the American (*Venosa*), as I have shown above. But further, the American *has developed a second distinct winter form*, viz.: *Oleracea hyemalis*, originating apparently with the immaculate males of *Venosa*. That *Oleracea* was considered by Dr. Boisduval as peculiar to America is evident from his description, Spec. Gen. 1, p. 518: "*Oleracea:* Upper side absolutely as in our *Napi, but without any black mark, so that the four wings are wholly*

white, with the base of primaries a little blackened. Under side as in *Napi except that there are no black spots, and that the origin of costa of secondaries is a little saffron colored. It replaces in the U. S. our Napi.*" Boisduval, in describing *Napi*, says nothing of yellow or orange at the origin of costa of secondaries. When he speaks of *Bryoniæ* he gives that character, "almost always a little saffron colored." I find some European *Napi* without any shade at base of costa deeper than rest of the wing, others with a deeper yellow there, and in three examples the yellow deepens to pale orange. This orange shoulder is a persistent character in *Oleracea hyemalis*.

Dr. Harris described *Oleracea* in N. E. Farmer, and also in Ins. Mass., thus: "Wings white, dusky next the body; the tips of the upper ones yellowish beneath, with dusky veins; under side of hind wings straw-color, *with broad dusky veins, and the angles next the body deep yellow*." This is *Oleracea hyemalis*.

In Agassiz' Lake Superior, Dr. Harris says: "*Oleracea:* Wings yellow-white, the anterior pair dusky on the front edge and base; tip beneath pale yellow with dusky veins, under side of the hind wings pale yellow with broad dusky veins and *a saffron-yellow spot in the humeral angle*. The tip of the fore wing is often marked with two or three dusky stripes in the males. (The dusky veining of the hind wings is less distinct in the females than in the other sex, and is sometimes entirely wanting. Specimens of the females have been seen, though rarely, with one or two dusky spots on the upper side of the fore wings). The last clauses, which I have enclosed in parenthesis, describe the summer form of the female, but the description of the male is of the winter form.

I am familiar with *Oleracea* as it appears in the Catskill Mountains of New York, having observed it at different seasons of the year, and bred the larvæ from eggs laid by females in confinement. The male of the typical winter form has the bases of the wings largely blackened, the costa of primaries heavily edged with black, and the apex more or less so; the anterior nervules are apt to be edged with black. The under side is either white with the faintest tint of yellow, or secondaries and the apical area of primaries are decidedly yellow, and individuals vary between these extremes. The nervures and branches on secondaries are bordered with gray-brown, sometimes heavily, sometimes moderately; so are the nervures of primaries moderately edged. The shoulders of secondaries are saffron or deep orange-yellow. Sometimes there is an indistinct spot on fore wings of male, usually a mere cluster of scales. The females are colored like the males, but have the gray at base of primaries more extended; so also along costa, but otherwise they agree with the males on both surfaces and vary in precisely the same manner.

But in the southernmost range of the species, where there is more than one annual generation, some of the early or winter butterflies assume characters of the summer generation, due doubtless to intercrossing, which must take place, as belated individuals of the first brood would be on the wing when the earlier of the second brood appear. In my own experience I have had both heavy-veined and very light-veined butterflies in the spring from chrysalids of same brood of preceding year from the Catskills. Mr. J. Alston Moffat, of Hamilton, Ontario, has sent me 3 ♂ 2 ♀ taken by him between 13th and 26th May, 1877, and therefore of the first generation of the year. One male and one female have the veins moderately heavy; 2 ♂ 1 ♀ light, and like the usual summer generation. And Mr. Moffat wrote that he had 5 ♂ 1 ♀ remaining, caught at same time, of which two males were heavily shaded, one remarkably so, two lightly shaded, and one had the shading scarcely visible, and that the female corresponded to this last male in the light shading.

Although *Venosa* is the winter form of the Pacific Coast, yet occasionally an *Oleracea hyemalis* is brought in by collectors. I have one male taken in 1880, by Mr. H. K. Morrison, on Mt. Hood, Oregon, of the extreme type, so far as indicated by the under surface, which is as heavily veined as a male of *Frigida* sent me by Mr. Scudder. Placed side by side I can see no difference between the two on this surface. But the upper side is neither grimy nor black-veined, like *Frigida*, and is like *Oleracea* of New York.

How far to the north we must go to find *Oleracea* monogoneutic I am unable to say. Kirby says that 3 ♂ were in the collection made by Richardson and submitted to him, and that these came from lat. 65°, which would be not far from the mouth of Mackenzie's River. What is remarkable is that *all of these were of the summer type*,* with merely a few scales on the nervures of secondaries below. This would imply that two generations fly at that high latitude, almost at the Arctic sea. On the other hand, I had, several years ago, from Mrs. Ross, of Fort Simpson, on Mackenzie's River, about 62° lat., a large number of specimens of *Oleracea*, all more or less heavily veined, the winter type. These were the Slave Lake examples referred to by Mr. Scudder in his paper on North American Pierids, 1861, in which he says that the indications therefrom are "that the paler forms are more commonly met with in the more southern localities, and the more heavily marked ones are the characteristic forms of the north." If one might hint that there was a mistake in labelling those pale butterflies of Richardson, the mystery would be cleared up, and otherwise I do not understand at all how *Casta*, Kirby, could be found at so high a latitude. A very large part of the lepidoptera described by Kirby are stated to be from Canada and other more southern localities. I have now before me five males of this lot from

---

**Casta*, Kirby, being synonymous with *Oleracea æstiva*.

Slave Lake, and they are alike, immaculate, and heavily veined on under side. I have no female from Slave Lake to compare with others.

Several males from Godbout, Pr. Quebec, and from Anticosti, are like the Slave Lake examples, and four females from Anticosti are immaculate, and like the males, heavily veined, etc. These are *Oleracea* var. *Borealis*, Grote, Bull. Buf. Acad., 1873; described as having "the markings on the wings much darker and broader than usual, especially beneath." I had both the Godbout and Anticosti examples from Mr. William Couper, who spent two summers on the island and visited Godbout, which is on the main land, north shore of the St. Lawrence. As Mr. Couper did not meet with *Bryoniæ*, it cannot inhabit Anticosti, although that island is but one hundred miles from Newfoundland. This var. *Borealis* is of great interest in one respect. On the Continent we do not know where *Oleracea* becomes single-brooded. In New York and Canada it is double-brooded. It may be single or double at Slave Lake; except for Kirby's statement the evidences are in favor of its being single. At Godbout, where the snow lies nine feet deep in winter, and the summers are short, probably it is single. But in Anticosti, we know from Mr. Couper that the summer embraces only part of June and all of July, and that by 1st August the weather is turning cold. And it is his opinion that no species of butterfly on that island has more than one generation. Originally coming from the main land, *Oleracea*, whatever were its habits there, is, or becomes, single-brooded on the island, and breeds true to one type, the heavy veined extreme variety of the winter form. *Bryoniæ* in Newfoundland is a relic of glacial times, maintained by its insulation.

Frigida, Scudder, seems a little removed from typical *Oleracea hyemalis*. It is described as coming from Cariboo Island, Labrador, 2♂.2♀. The nervures of both wings are said to be more heavily marked than in the darkest individuals of *Oleracea;* "the black scales at base on upper side are more profuse and more widely spread, frequently bordering the nervures quite heavily; indeed, gray scales are more or less scattered over the whole upper surface, giving the insect a grimy appearance, increased by the slightest possible yellow tint." "The extreme limits of variation of *Oleracea* do by no means permit us to include within its boundaries this form; it is more heavily marked than the extremes of *Oleracea*." It is also stated that the hind wings of the male "are proportionately narrowed across the hind margin, and broader across a line parallel to it, near the base of the wing, than in male *Oleracea;* or, in other words, *the secondaries of Frigida are relatively more quadrate and those of Oleracea more triangular*." No special mention is made of female *Frigida*, and it is to be presumed that in general it resembles the male. In reply to a recent note on this subject, Mr. Scudder says: "I have only 2♂, no ♀. The ♂ is like *Oleracea hyemalis*, but is duller, yellower, *and has longer hind wings with much longer discoidal cells*." In originally describing this form Mr. Scudder had before him my Slave Lake examples, and when he says that *Frigida* "is more heavily marked than the extremes of *Oleracea*," he included in this last individuals as extreme as var. *Borealis*. *Frigida* is another island form brought over from the main land, beyond doubt single-brooded, and seems to have acquired some peculiarities of its own.

The summer brood, *æstiva* of *Oleracea*, is often of larger size of wings, and the wings are thinner, and purer white on upper side than in *hyemalis*. So the base is less obscured, the costa, apex and hind margin not at all. On under side it is either white or delicate yellow; the veins of both wings are but scantily edged with brown scales, and often not at all over considerable areas. The females have the basal and apical areas pale gray, and not infrequently there is a trace of the spot of *Napi* on upper median interspace. Sometimes also a trace of the second spot (in sub-median interspace), and of the gray bordering to inner margin of primaries. The veins beneath are rather more edged with brown scales than in the male. The shoulders of hind wings are of a *very pale yellow* (in *hyemalis* decidedly yellow or saffron), and often there is no color at all. There is some difference in the shape of the wings in each sex, some individuals having the apex of primaries more rounded than others, and secondaries more narrow.

I have found that eggs laid by females of *hyemalis* in confinement produce the same season butterflies, *aestiva*, and that eggs laid by *æstiva* produce the following spring *hyemalis*. But in one instance from eggs of *æstiva*, laid in the Catskills, there emerged, at Coalburgh, the following March, *two butterflies, one of which was* as *true æstiva as the parent, the other hyemalis.*

The summer form is identical with *Casta*, Kirby, described as having the wings white; black scales sprinkled over costa of primaries; secondaries beneath, with a few scattered black scales along the nervures. The female *Oleracea* of Harris, in Agassiz' Lake Superior, is this *æstiva*, as before mentioned.

Boisduval also described P. *Cruciferarum*, Spec. Gen., 519, ♂. A little smaller than *Rapæ*. "Upper side of the wings almost the same white, immaculate; primaries having only the anterior third of the costa and a part of the base dusted gray. Under side of secondaries and summit of primaries washed with very pale sulphur-yellow; secondaries have the origin of costa of a light yellow-orange. *It replaces our Rapæ in the middle U. S.*" As *Rapæ* was then (1836) unknown in N. A., this could only be *Oleracea æstiva*. That is, it is the summer generation of what Boisduval had before described as *Oleracea*.

Venosa, therefore, represents *Napi* (winter form) at the extreme west, and *Oleracea hyemalis* represents the same *Napi* to the eastward, in almost all known localities. Specimens from

Nevada and Colorado are usually immaculate and not distinguishable from *Oleracea hyemalis.* This form and typical *Venosa* are considerably unlike, but their summer generations approach and are often precisely alike. The summer generation of *Venosa* is *Pallida* Scudder, described; ♂ as "immaculate, yellowish beneath, with sometime a few indistinct grayish scales scattered along the nervules; otherwise quite immaculate. The female has, in addition, a *band of grayish scales on the posterior border of primaries*, and *a spot or cluster of grayish scales in upper median interspace*." All this is but the description of many examples of *Oleracea œstiva* ♀, and of all males. But the variety of the summer form of *Venosa*, which has a black spot on primaries, was not before Mr. Scudder when he drew up his description. This is *Castoria*, Reakirt, the male only described; it is said to have "*a rounded black spot on the medio-superior interspace of primaries;* no other markings; underneath immaculate." *Castoria*, then, is one sub-form, *Pallida* the other, and both undoubtedly appear in same brood, *i. e.*, in the generation following and proceeding from *Venosa.*

Of four ♂ under view from Lake Lahache, Brit. Col., 2 are immaculate (*Pallida*), 2 have a light spot (*Castoria*). I have but one ♀ and that has no spot, but the marginal border is gray. From Vancouver's Island 1 ♂ is immaculate, one has half a dozen scales only in place of a spot; but a third ♂ has a black spot. With these are 2 ♀ and both have the two spots of *Napi* and dark border. 1 ♂ from Oregon is immaculate. Four males from Washington Terr. are immaculate; but the 2 ♀ with them have both spots and the border. *One of these is yellow on upper side.* Two males from California have the upper spot only, their females both spots and the border. One female from southern Colorado has both spots and border, but the males accompanying are immaculate, and may be called either *Pallida* or *Oleracea œstiva.*

It appears therefore that while several males from the Pacific coast, under view, are immaculate (*Pallida*), about one-half have the spots in greater or less degree (*Castoria*), but that all the females except one have, on the upper surface, the spots and dark border to primaries which characterises *Napi*, and the one exception has the dark border. One female *Pallida* from Washington Terr. is of a pale but decided yellow on both surfaces—another departure. I have noticed this in no *Oleracea œstiva.* Just as from *Rapæ*, in New England, there has developed a yellow form, the *Nova-Angliae* of Scudder.

We have seen then that starting with the common form *Bryoniæ*, the next generation, *Napi* in Europe, *Venosa* in America, differs perceptibly. Also that *Venosa* has an offshoot in *Oleracea hyemalis* which occupies a more extensive territory than the parent. Now the second generation of these two, which corresponds to *Napææ*, is far removed from that form. *Pallida* ♂ is immaculate on both sides, its co-form *Castoria* has a spot on primaries, otherwise immaculate on both sides. The common ♀ has a gray border to inner margin of primaries, and a spot on same wing: otherwise immaculate on both surfaces. *Oleracea æstiva* ♂ is immaculate on both surfaces, the ♀ also, except that a few scales sometimes suggest a spot on upper side, and sometimes there is a slight and pale bordering to inner margin.

But *Napææ* ♂ has *one or two black spots* and marginal border, *two spots on under side, a spot at outer angle of hind wings on both sides; the whole costal edge on under hind wing deep yellow,* things never seen in American examples. The ♂ *has two or three large and deep black spots, &c.* In fact, THE ♂ NAPÆÆ RESEMBLES BRASSICÆ ♂ MORE CLOSELY THAN IT RESEMBLES THE FEMALE OF THE CORRESPONDING AMERICAN FORM.

4. VIRGINIENSIS. I described this form as Pieris *Virginiensis* in Butterflies of N. A., vol. 1, and gave accurate figures of both sides of both sexes. The male above is more or less obscured by brown, or dusted with brown, and often to a considerable degree. In some examples the brown scales are scattered over the whole surface, but are dense on apex, costa and basal half of primaries, and at base and along the principal nervures of secondaries; a gray patch also on costa of secondaries. Under side *always white* (*Oleracea* and *Pallida* are most often yellow), the *nervures and branches bordered with ashy-brown of a shade not found in any American form except Hulda.* Individuals vary in the extent of this brown, from slight to very considerable. The female has the upper surface more obscured, and the brown edging to the nervures and branches is sometimes so extensive as almost to conceal the ground color, as in *Hulda*. *Virginiensis* is smaller than *Oleracea*, the males averaging 1.7, and no female examined expanding over 1.9 inch. The wings as a rule are longer and narrower than *Oleracea*, though the latter, as before stated, varies in this respect; and they are delicate as in *Oleracea æstiva* if any thing more delicate and thinner.

The first examples of *Virginiensis* ever seen by me were received from Mr. Wm. Saunders, the ♂ having been taken in Ontario, the ♀ at Quebec. They were sent as *Oleracea* with several of the latter. I have three males from north and south Colorado. In my collection I have 12 examples, 5 being those mentioned, and 7 from Coalburgh. Mr. Mead has taken a female at Stony Clove, Hunter, N. Y., on the Catskill Mountains.

For several years, and up to 1872, a few individuals were taken at Coalburgh in each year, usually in April, once in last half of March, and once only in May, and there was no other Pieris flying at the same season in these years except *Vernalis*, the spring form of *Protodice*, and that was seen very rarely, some years not at all. The dates of capture of *Virginiensis*, or when they were seen, but not captured, are recorded in my journal thus:

1867,	11th	April	took	1 ♂.	1871,	20th	March	took	1 ♂
	21st	"	"	2 ♂.	"	7th	April	saw	2 ♀
1868,	24th	April	"	1 ♀.	"	8th	"	saw	1 ♂
1869,	25th	"	"	1 ♂.	"	9th	"	took	4 ♂
	28th	"	"	12 ♂.	1872,	17th	"	"	1 ♂
1870,	15th	May	"	1 ♀.	"	29th	"	"	5 ♂

The spring of 1870 was cold, and we had ten inches snow-fall on 18th April. In 1871, on the other hand, we had fine weather all through March, and peach trees were in bloom on the 11th. Therefore the appearance of *Virginiensis*, so early as 20th March, 1871, and so late as 15th May, 1870, is accounted for. Strictly, it is an April butterfly, coming with the early flowers.

No second generation appeared here in these years. In the first place, it is hardly possible that I, myself, should have failed to take or see individuals of a later generation if there were any. One single example during these six years would have served to attest the existence of a second generation. Also, I had boys in my employ instructed to take everything; and of *Virginiensis* subsequent to May, or of a second generation, none appeared in their collectings. In the next place, between 1867 and 1872, the late Mr. Ridings, a most indefatigable collector, spent one whole season here, and again the month of September. Mr. Julius E. Meyer, a month in midsummer of two years, and again in September. Mr. Mead collected here repeatedly, both before and after 1872. All these gentlemen were experts with eye and hand, and thoroughly acquainted with North American diurnals, but no one of them found an example of the second generation of *Virginiensis*. Therefore I assert with confidence that such a generation has no existence here.

In 1874, *Rapæ* first made its appearance in this valley. I recorded as follows: 1874, 17th September, "took 1 ♂ *Rapæ*, the first of this species ever seen here by me." On 6th Oct., "saw several *Rapæ*.' In 1875, 8th April, "saw several *Rapae*," and from that day to this the species has abounded all the season. I was absent from home from 1st April to 15th May, 1873, and so know nothing of *Virginiensis* that year; but since 1873 I have not seen one example, though I have carefully sought for it in the hope of breeding from the egg, and so learning its history.

But so long as *Rapae* is a thousand to one, the weaker species will be overlooked at least, being undistinguishable on the wing among so many white butterflies of same size, and probably will soon become extinct. Perhaps it is already extinct in this locality. I hear from Massachusetts, New Hampshire, New York and Canada, the same story of the absolute disappearance of *Oleracea* where, fifteen years ago, it abounded, before *Rapæ* had conquered the country.

I have no information as to the month in which *Virginiensis* has been taken in any northern or western locality, except in the one instance spoken of, when Mr. Mead captured a female, which was in the last week of June, 1873, in the Catskills. This was undoubtedly one of the first generation. (Stony Clove has an elevation of 2,500 feet, and the trees there are not fully in leaf before June.) Mr. Mead set this female in a bag on the food plant and obtained many eggs. In a letter dated July 10th, he says he had then but one larva, one quarter grown, which would be after the second moult. July 18th, he had sent the chrysalis from this larva to Miss Peart for a drawing, and the drawing I have. Mr. Mead informs me that from this chrysalis emerged *Oleracea*.

We must conclude, therefore, that *Virginiensis* is an offset of *Oleracea hyemalis*. It is singular that it should be so, differing as this form does from *hyemalis* in *the delicacy of the wings, their pure white color beneath, and in the paleness of the yellow humeral border*. All which is in direct contrast to *hyemalis*. So the wings are narrower than in *hyemalis*, and the gray brown dusting and bordering of the nervules is in strong contrast with the same form. It would seem in several respects more likely to have come from *æstiva*. In West Virginia, this form *Virginiensis* is also of the winter generation, and breeds true to its type, as appears by all the examples taken during a series of years. As I have said before, it has no second brood in Virginia. The offshoot of a polygoneutic species has become single-brooded or monogoneutic. This is probably the result of climate. *Oleracea*, *Napi*, *Bryoniae*, all are northern forms. The fauna of this region is southern, whether botanical, ornithological or entomological, or at least much more southern than northern, and the long hot summers are not favorable to this Pieris. The mild winter permits a modified form, more like the summer generations of the north than the winter generation, and this is held true to type by there being no second brood.

The first or original winter form, *Bryoniæ*, was left in the sole possession of its arctic territory, after, by its southward emigration, a climate bad been reached which allowed two annual generations to mature, and what then began as the summer form ended by displacing its parent over the sub-boreal regions, and itself became the second winter form, *Venosa;* developing a second generation of its own, *Pallida*. But, collaterally, through *Oleracea hyemalis* comes *Virginiensis* which along the southern limit has in its turns displaced *Venosa*, being in sequence of derivation the third winter form. But this has no second generation, and in habit is like an *Anthocharis*, in which genus the butterflies appear in spring, and have no second brood, all the chrysalids going over to the next year. In fact, *Virginiensis* has parted company with *Venosa* and the rest, and has become a true species, although unquestionably, in a higher latitude, it appears as an occasional aberration only of *Oleracea*.

The chrysalis of *Virginiensis* as appears by the colored drawing spoken of is of precisely the same shape as that of *Oleracea*. It has a minimum of black dots over its surface. On the other hand the chrysalis of *Bryoniæ* from Newfoundland shows a maximum of these dots, and several little dusky clouds or spots, as might be expected from the clouded and spotted wings which are to issue therefrom. The chrysalis of *Venosa*, from California, comes next to *Bryoniæ* in these marks: that of *Oleracea* var. *Borealis*, from Anticosti, having few marks, like *Oleracea* in New York. I have drawings of all these; and of all but *Virginiensis* have preserved chrysalids also. There is not the least difference in shape in these chrysalids.

We are now prepared to tabulate the American forms derived from *Bryoniæ*, and I contrast them with the corresponding European forms:

EUROPEAN.	AMERICAN.
1. Arctic form BRYONIÆ, Ochs.	1. Arctic form BRYONIÆ, Ochs. var. HULDA, Edw.
2. Winter form NAPI, Esper.	2. 1. Winter form VENOSA, Scud. *Nasturtii*, Bois. aberr. ♀ FLAVA.
	2. Winter form OLERACEA HYEMALIS, Harr. *Oleracea*, Bois. var. A. BOREALIS, Grote. " B. FRIGIDA, Scud. aberr. VIRGINIENSIS, Edw.
3. Summer form NAPÆÆ, Esper.	3. 1. Summer form ACADICA.
	2. Summer form *a*. PALLIDA, Scud. *b*. ♂ CASTORIA, Reak. aberr. FLAVA.
	3. Summer form OLERACEA ÆSTIVA, Harr. *Casta*, Kirby. *Cruciferarum*, Bois.
	4. SPECIES (Southern) VIRGINIENSIS, Edw.

I believe this to be an accurate statement of the phases of the American forms derived from *Bryoniæ*, and it is based on my own acquaintance with them. Not being so familiar with the European derived forms, and restricted to descriptions, plates, catalogues and such specimens as I could collect by the aid of friends, I can only give the three principal and well-known manifestations, doubtless omitting some important variations not named. But the general statement on one side, and the particular one on the other, are sufficient to show how climate and environment affect the descendants from a common parent-form. How the differences, at first slight, gradually become considerable, and at last the outcome of the derived forms on the two continents is distinct, the late descendants being parted by specific differences. How an aberration leads to a permanent variety; how insulation produces permanent varieties; how a variety becomes a species, breeding true, not subject to reversion, and adapted by change of habit to altered circumstances.

NOTE.—Since this paper was put to press, I have received from Dr. Staudinger 2 ♂ and 2 ♀ of Lapland *Bryoniæ*.

One of the males has the nervules and branches of under side of secondaries bordered with brown in same manner as the Alpine examples spoken of; but the other has an excess of the brown edging, so that nothing of the ground color of the wing is seen except a narrow stripe in cell and streaks in the interspaces of the nervules. In this respect this example resembles *Hulda*.

NOTE ON PLATES.—These were drawn and printed in London, and no opportunity for correction of errors could be given. Figs. 7, 11, and 13 would represent the forms as having black spots on under side of primaries, contrary to the statement of the text. The artist has mistaken discoloration caused by the transparency of the wing, and only apparent when held to the light, for spots; but in all these butterflies the surface is absolutely free from black scales at the points indicated, and is white or yellow, whereas in *Napi* and *Napææ* the black spots of underside are caused by black scales laid on.

DESCRIPTION OF PLATES.

PLATE 2.

WINTER FORMS.

EUROPEAN.

1.	*Bryoniæ* (Alps)	♀
2.	*Napi* (Germany)	♂
3.	*Napææ* “	♀

AMERICAN.

4.	*Bryoniæ* (Newfoundland)	♀
5.	*Hulda* (Alaska, &c.)	♀
6.	*Venosa* (California)	♂
7.	“ “	♀
8.	*Oleracea hyemalis* (New York)	♂
9.	*Borealis* (Anticosti)	♂

PLATE 3.

SUMMER FORMS.

AMERICAN.

10.	*Acadica* (Newfoundland)	♂
11.	“ “	♀
12.	*Pallida* (Vancouver's Island)	♂
13.	“ “ “	♀
14.	*Castoria* (California)	♂
15.	*Oleracea æstiva* (New York)	♂
16.	“ “ “	♀
17.	*Virginiensis* (Coalburgh, W. Va.	♀
18.	“ “ “	♂

DESCRIPTIONS OF SOME NEW SPECIES OF N. AMERICAN MOTHS.

By Hy. Edwards.

EULEUCOPHÆUS SORORIUS. n. sp.

♀. Primaries pale reddish brown, a little paler at the posterior margin. The lines are broad white, the inner one oblique, not curved, and not reaching to the costa, the outer one slightly waved about the centre towards the posterior margin. In the median space, a little nearer to the inner than the outer line, is an oblong discal mark of yellowish brown. The costa at the base is brownish, in the median space it is flecked with white scales, and at the apex it is white from the junction of the exterior line. Fringe and internal margin whitish, with a pink tinge.

Secondaries, dull reddish brown, paler on the disc; the nervures very strong and distinct; the fringes clear white.

Beneath, the wings are pale reddish brown, the bands of the primaries faintly exhibited.

The fringes and the costal margin of secondaries clear white. Head, red brown, orange at the base of the antennæ. Thorax, red brown, with long grizzled hairs. Abdomen, chestnut brown, with broken whitish lateral bands. Antennæ beneath and tarsi bright orange.

Exp. wings, 3.00 inch.

1. ♀. La Paz, Lower California.

Type. Coll. Hy. Edwards.

GLOVERIA ARIZONENSIS. Packd.

♂. A specimen of this very rare insect is in my possession, and is, as far as I am aware, the only example of the ♀ sex known. It differs considerably from the figure of the ♂ in Mr. H. Strecker's "*Lepidopt. Rhoph. et Heter.*" Pl. 15, and I therefore offer the following description:

Primaries, brownish gray, covered with very long hairs, which have their origin at the base of the scales. These hairs are white at their tips, and give the insect a very grizzled appearance. Of the lines enclosing the median space, the basal one has a small tooth directed inwardly at its centre, while the exterior line is slightly curved throughout its length; the space between it and the outer line being rather widest on the costa. In the median space, nearest to the basal line, is a round white spot, clearer than is represented in the ♀. The submarginal line is nearly parallel with the median line, with the posterior edges dentate, though the teeth are not so deep as in Mr. Strecker's figure. Fringes concolorous. Secondaries, chocolate brown, with a grayish tinge, the hairs fewer than those on the primaries. Fringe, dusky white, speckled with gray. Beneath, the wings are all brownish gray, with the same grizzled appearance as on the up-ger surface; the fringes being wholly dusky white, mottled with pray.

Exp. wings. 3.15 inch.
Prescott, Arizona.
Type. Coll. Hy. Edwards.

PLUSIA CELSA. n. sp.

Allied to *P. 8-scripta* and *P. U. aureum*, but with the ground color of the wings of a paler shade of grey. There is also a resemblance to faded examples of *P. viridisigma*, Grote. The lines are all distinct, the spaces between them being deeply shaded with blackish, especially towards the internal margin. The t. a. line is whitish, edged with black, and becomes almost obsolete on the median nervule. The t. p. line is nearly even throughout its length, whitish, and as the t. a. line, edged with black. The submarginal line bold, distinct, toothed as in *P. viridisigma*, and shading into bright, pale grey on the margins. Metallic spot, greenish golden, generally, though not always, divided into two portions, the lower being a circular spot, and the upper triangular; the base resting on median nervule. Where joined by a small golden line, the spot in shape resembles that of *P. Gamma*, *L.* Secondaries ochraceous, with broad dusky margin and dusky shading at base. Fringe sordid white. Underside of primaries dusky, of secondaries ochraceous, with discal spots strongly marked; some whitish dashes on primaries, the margin of secondaries dusky. Fringes, alternately white and dusky.

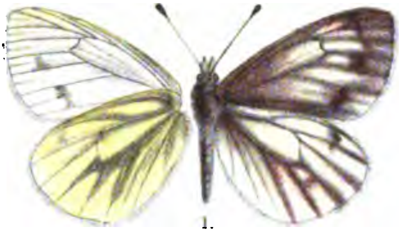
Size of *P. U-aureum.*
2 ♂. 1 ♀. Mt. Hood, Oregon. (H. K. Morrison.)
1 ♀. Dalles, Oregon. (Hy. Edwards.)
Type. Coll. B. Neumoegen.

XANTHOTHRIX NEUMOEGENI. n. sp.

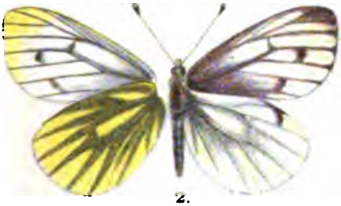
Whole insect, rich bright orange. Primaries with basal line wanting. A median and sub-marginal band rather broad, brownish orange, the inner one curved at the middle, and bent obliquely towards the costa; the outer slightly dentate, on the apex a paler spot. Margins brownish orange. Fringe orange, darker at extremity of nervules, which are very strongly marked, brownish. Secondaries with small blotch at base, a lunate discal spot, and the apex brownish. Under surface, wholly orange, with a faint discal spot on primaries. Head, thorax, abdomen and legs, wholly orange. Antennæ brownish.

Exp. wings. 0.85 inch.
Sta. Barbara Co., Cal. Mr. T. L. Mead. S. California, H. K. Morrison.
Types. Coll. B. Neumoegen, Hy. Edwards.

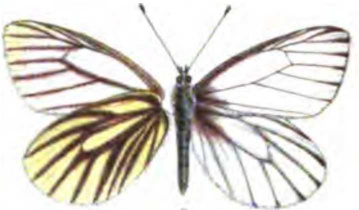
I have dedicated this exquisite speeies to my friend Mr. B. Neumoegen, whose earnest labors in his favorite science are worthy of the widest recognition, and to whom I am indebted for much valuable assistance.



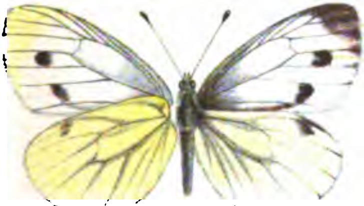
1.



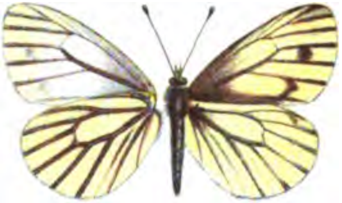
2.



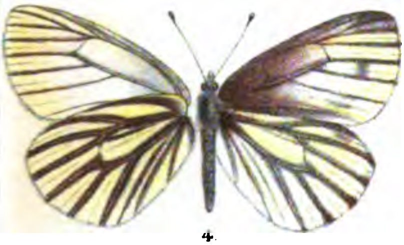
6.



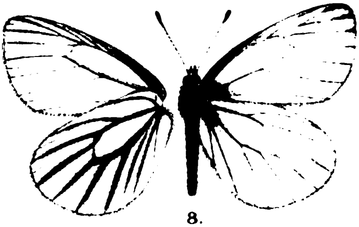
3.



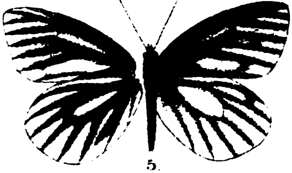
7.



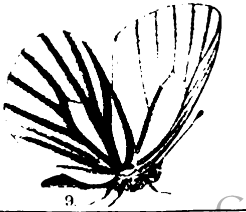
4.



8.



5.

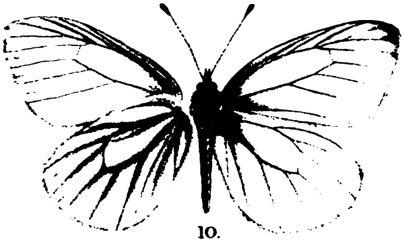


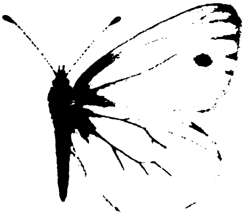
9.

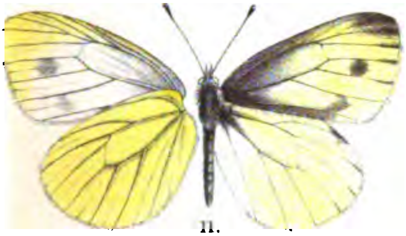
A.H. Searle del et lith

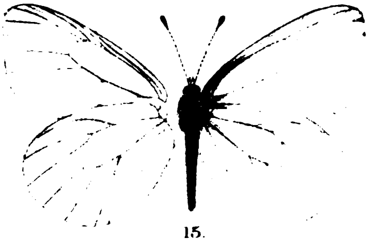
WINTER FORMS.

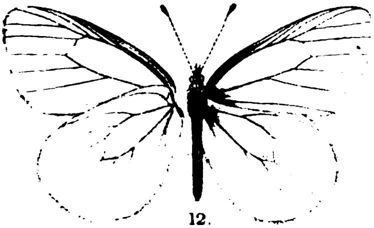
Mintern Bros. imp.

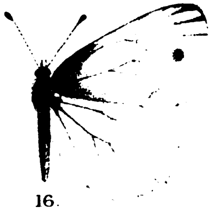

10.

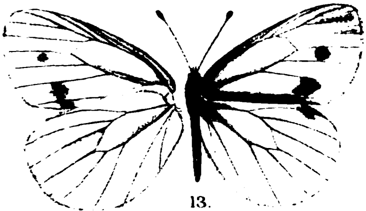

14.

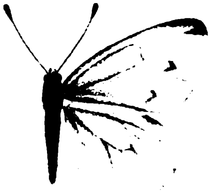

11.

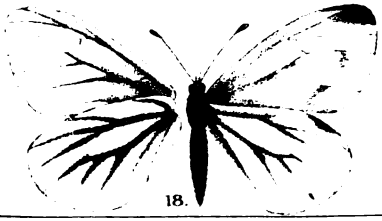

15.


12.


16.


13.


17.


18.

A H Searle del et lith

SUMMER FORMS.

Mintern Bros imp.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] July, 1881. [No. 7.

NOTES ON SOME NORTH AMERICAN LEPIDOPTERA.

By Arthur G. Butler.

Our good friend, Mr. Henry Edwards, has recently presented to the British Museum a series of 115 Lepidoptera with pupa-cases &c.; and, as at the same time, he writes that a few notes on these insects might prove interesting to the readers of "PAPILIO" I gladly forward observations on the *Sphingidæ*, which (if acceptable) I will supplement by remarks on the other groups.

HEMARIS CYNOGLOSSUM. *H. Edw.*

This species is nearly allied to the Texan insect to which I gave the name of *H. metathetis.* It differs in being slightly smaller and with the external dark brown border of the primaries of only two-thirds the width; these appear to be the only noteworthy distinctions between the two forms.

PTEROGON CLARKIÆ. *Boisd.*

This species, of which we previously possessed specimens presented by Lord Walsingham, although very similar in coloration to *P. œnotheræ* of Europe, agrees better structurally with my recently described genus *Cinogon*, differing from the latter principally in its even less dentated wings and better developed anal tuft. If *Lepisesia victoria* be conspecific with *P. clarkiæ* the generic name ought certainly to be retained for this species. The name *Proserpinus* must be rejected altogether, as it is the original name of *P. œnotheræ;* (which should therefore stand as *Pterogon 'proserpina'* of Pallas).

DEIDAMIA INSCRIPTA. *Harr.*

Seems, excepting in the form of secondaries, to be intermediate in structure between *Lophura continua* (of Brazil) and *Amphion nessus:* It also seems allied to *Mimas* and *Cypa*, two old world genera of *Smerinthinæ*. To which has it really most affinity?

ENYO LUGUBRIS. *Linn.*

The example sent by Mr. Edwards was taken at Indian River, Florida, and agrees with examples of *E. camertus*, Cramer, in the Museum collection from Mexico. I am, however, quite prepared to believe that this red form is merely a common sport of the Linnean species.

AMPELOPHAGA VERSICOLOR. *Harris.*

I am very much interested in seeing this species for the first time; judging by Strecker's figure only, I referred it to *Elibia*, but (as he has himself declared) "the only point in common between" *E. dolichus* "and *versicolor* is the pale dorsal line," though strictly speaking, Strecker should have said the only salient point, since, to mention another point, they are both *Sphingidæ*.

Now, that I have examined and compared *versicolor* in the chitine, (I suppose I must not say "in the flesh") I find that it agrees in every detail of structure and nearly every detail of pattern with *Amphelophaga rubiginosa*, of Bremer, from China and Japan.

From *Otus chærilus* and *myron*, *Ampelophaga* is distinguished by its less falcated and less distinctly sinuous (the German word "geschwungen" best expresses the character) outer margin of the primaries, fuller secondaries, well defined dorsal line on the body and more curved banding of the primarics. I mention the color characters because they usually represnt a sub-generic if not a generic value.

CHŒROCAMPA TERSA. *Linn.*

An example from Florida sent by Mr. Edwards comes nearest to specimens in the collection from Mexico.

DEILEPHILA LINEATA. *Linn.*

So far as I have hitherto been able to judge, this moth does not vary in anything but size, 66 to 100 millimetres in our examples.

PHILAMPELUS ACHEMON. *Drury.*

Mr. Edwards has sent us the pale variety of this beautiful species, and although I have no remarks to make about it, I may perhaps be permitted to speak of another New World *Sphingid*, recently referred by Dr. Burmeister to this genus.

Quite recently, through the generosity of Walter de Rothschild, (the eldest son of Sir Nathaniel) we acquired a specimen of the *P. Eos* of Burmeister from Buenos Ayres, and I am quite satisfied from a careful comparison of this species with the whole of our *Sphinges* that it is either an *Ambulyx* or a genus extremely close to it, and has no affinity to *Philampelus.*

SMERINTHUS OPTHALMICUS. *Boisd.*

I am glad to find that I rightly identified this species in my "Revision of the Sphingidæ," although at the time I had very little doubt about it.

SPHINX CHERSIS, VAR. OREODAPHNE. *H. Edw.*

If this form is constant to any district, I see no reason why it should not be regarded as a distinct species; it is not only considerably smaller than our examples of *S. chersis*, but the primaries are comparatively shorter and the coloration decidedly bluer in character.

SPHINX PERELEGANS. *H. Edw.*

Although nearly allied to *S. chersis*, this species (in the pattern and coloration of the secondaries) takes a step in the direction of *S. leucophæata*.

ANCERYX EDWARDSII, sp. n.

Allied to *A. fasciata* Swainson, and *A. alope* Drury; the primaries altogether blacker, more sericeous, the zigzag black lines more equally angulated between second median branch, and inner margin relieved by a white instead of a pale brown background, the central black line on the dorsal abdominal band less strongly defined than in *A. fasciata*, and therefore similar to that of *A. alope*. Expanse 81 millimetres.

Indian River, Florida. *H. Edw.*

Mr. Edwards sent a male example with note—"We have called this *Anceryx scyron*, but think we must be in error. Will you kindly tell me its real name,"—and as it does not belong to the *scyron* group (Genus *Isognathus* Felder) and moreover has not hitherto been named to my knowledge, I have taken the liberty of dedicating it to my excellent friend.

Isognathus scyron is a species occurring in Surinam, of which I have hitherto seen only one example, and that not in our collection; like my *I. metascyron* it has a red-brown abdomen banded with black.

Anceryx alope (unlike the species of *Isognathus*) has a brownish white body transversely banded with black, and dorsally banded with dark grey striped with black, the anal segment being of a reddish wood-brown color at the sides and black in the centre; the wings and thorax are pale red brown, but so widely suffused and striped with dull slatey grey and black that very little of the ground color appears, an oblique diffused streak across the median interspaces and cut by the zigzag *discal** lines whitey-brown (but not white); the secondaries are bright orange to a little beyond the middle, the remainder being dull black with the border very slightly greyish and a marginal series of intense black dashes, or in other words an interrupted black marginal line: from this form Swainson's *A. fasciata* is distinguished by its distinctly whiter body, paler primaries, which are often largely varied with the red or whity-brown of the ground colors. In *A. Edwardsii*, on the other hand, this reddish brown coloration is confined to the thorax and the fringe of the wings.

CAUTHETIA, sp.

"*Ænosanda noctuiformis*, Walk" on label.

(Two examples) Indian River, Florida.

I hope Mr. Edwards will describe this pretty little species; it does not agree with Walker's type from St. Domingo, the primaries are considerably darker, and the dark brown border of the secondaries of only half the width: it must be distinct.

---

* Guenee and others have wrongly used this term instead of "*discoidal*" in speaking of markings upon the wing-cell.

A PARASITE IN ÆGERIA SYRINGÆ. HARR.

BY G. H. FRENCH, Carbondale, Ill.

When examining the stems of some lilac bushes in my yard, I found a place in the bark of one where it seemed that an Ægerian pupa might soon protrude for the purpose of liberating the moth. Upon cutting away the thin film of bark, I found the end of a chrysalis visible. I carefully cut away the wood, took this out and put it in a jelly dish surrounded with lilac leaves to prevent its drying up, and waited for the imago to come forth. June 5th, a week after the chrysalis had been put into the jelly dish, I saw something among the leaves which I supposed was the expected moth, but which proved to be a hymenopter. I did not know but the insect might be one of the boring bees that often resort to the holes left by Ægerians in which to rear their young, but an examination of both the insect and the empty pupa case assured me that I had a parasite. The chrysalis was certainly that of an Ægerian, having all the characteristic marks of the pupæ of that family; and the insect in emerging from it had gnawed a hole near the end on the left side instead of the usual method of emergence of insects from their own pupa cases. More than this, the specimen was a true Ichneumonide and not a Crabronide as I at first thought it might be. This is the first time I have known of any parasite working in the Ægerians.

I make the parasite to be *Phæogenes Ater*, Cres. It is shining jet black, 40 of an inch long, the antennæ 25 jointed, the first 8 black, the next 4 white and the rest dark brown. The joints of the legs are a little pale.

It is impossible for me to say when the parasite was introduced into its host; but it must have been before it pupated, because the chrysalis when taken from the bush was entire, showing no broken place. That the Ægerian was *Æ. Syringæ*, I have no doubt, as I do not know of any other boring in the lilac.

LEPIDOPTEROLOGICAL NOTES.*

BY PROFESSOR C. V. RILEY.

PLUSIA BRASSICÆ, Riley (Rep. II. p. 111).—Notwithstanding its close resemblance to *ni*, the best authorities agree with Zeller in considering it distinct, as it certainly is. Strangely enough this same *brassicæ*, or what is extremely close to it, occurs also in South Europe and is figured in Stainton's *Entomologist's Annual* for 1870 as *P. ni*, one specimen having been found on the south coast of England, which specimen Zeller, as he wrote me, believes to have come from America. Staudinger would probably characterize *brassicæ* as a "species Darwiniana," and there are doubtless individuals of both the species which approach each other so closely as to be undistinguishable. There is such variation in the silver spot in either that it cannot be depended on alone, but Speyer (Europäisch-Americanische Verwandtschaften; *Stettiner Ent. Zeit.*, June, 1875, p. 165) has presented other differences that are constant in detail, the most noticeable of which are the darker and more irrorate coloring and the interrupted and wavy terminal line of *brassicæ*, against the paler, smoother, more metallic coloring and the perfectly straight and unbroken terminal line of *ni*.

---

*From advance sheets of Bulletin 6, U. S. Ent. Comm., being General Index and Supplement to the Missouri Entomological Reports.

The larva is the most common cabbage pest in the Southern States, and is infested with an undetermined parasite. Mr. E. A. Popenoe has found its feeding on the leaves of *Crepis*, and what appears to be the same has been found by my assistant on Clover, Dandelion, *Senecio scandens*, and *Chenopodium*.

GORTYNA NITELA Guen. (Rep. I, p. 92)—I have proved by breeding that *G. nebris* Gn. is but a large, southern form of this species. In the Southern States it is most common in stems of *Ambrosia trifida*, often producing a swelling or pseudo-gall. Both forms are indiscriminately bred with intermediate variations. See an article by Miss E. A. Smith (7th Report on the insects of Illinois, Cyrus Thomas, pp. 112–114) for additional food-plants and the habit of the younger larvæ to infest wheat-stalks, corn, etc. See also Am. Ent. I, p. 252; my "Potato Pests" (Orange, Judd & Co., 1877, p. 91) and *Prairie Farmer*, August 11, 1877. The insect normally purpates in the stem and when infesting thin stalks like those of most cereals and blue-grass (in which it also is found), often of necessity leaves one stalk for another.

ANOMIS XYLINA, Say (Rep. II, p. 37; VI, 17)—This has since been referred by Grote to Hübner's *Aletia argillacea*, which has been generally adopted. See Bulletin 3 of the Commission on the Cotton Worm. While it will doubtless be found convenient in future to separate it from the other species of the genus *Anomis* and Hübner's generic name may therefore obtain, I must confess after a careful examination of Hübner's figure of *argillacea* to grave doubts as to the correctness of Grote's reference thereto of our Cotton-worm Moth (*xylina*, Say). Hübner's figure lacks several of the most constant characteristics of *xylina*. It is fulvo-testaceous shaded with brown, with the under side bright yellow. It lacks the three white specks on primaries and has a dark (*orbicular?*) spot in place of the outer one. It has a large white circular spot with black annulus in place of the dusky elongate discal spot with its double pupil. The wavy lines are almost black and differ in form; the fringes are unicolorous, and the abdomen is narrower. The figure more nearly represents in fact a species which I have received from Bahia, Brazil, and which differs from *xylina*, though the larva (also quite different) feeds on cotton.

We are all inclined to follow determinations of those who make a specialty of any group, but after due allowance for faulty coloring in Hübner's figure, I am constrained to believe that in this instance Mr. Grote has been in fault.

PEMPELIA GROSSULARIÆ Packard (Rep. I, p. 140)—The European *Zophodia convolutella* Hübn. (*Phycis grossulariella* Treitschke), which has precisely similar habits, closely resembles this species. In 1871 I compared it with this last in Mr. Stainton's collection and with specimens received from Prof. Zeller and could detect no essential differences. The European specimens are slightly larger, with broader wings and usually clearer, paler gray coloring. Colorational markings are, however, very variable in specimens from both sides of the Atlantic.

P. grossulariæ Packard was subsequently described by Grote as *Dakruma turbatella* (Bull. U. S. Geol.-Geog. Survey, IV, No. 3, p. 702; 1878). *Dakruma* seems to differ from *Zophodia* in nothing but the absence of the basal portion of the subcostal vein and possibly, although this character is not mentioned by Grote, in the recurved palpi. According to the synoptical table given by Heinemann, *grossulariæ* would fall in the genus *Stenoptycha*, distinguished from *Zophodia* by the recurved palpi. We may well question the generic value of this character, for different authors describe it quite differently: thus, Heineman describes the palpi of *Stenoptycha* and *Homeosoma* as recurved, whereas Grote describes them as porrect in these two genera, if we accept his statement that *Honora* Grote is to be considered a section of *Stenoptycha*: there appears also to be a difference in position in specimens of the same species, according as the palpi are heavily scaled or have lost the scales. From the known individual variation in the venation of these and other moths, especially in the hind wings, we cannot attach any specific, much less any generic, value to the slight difference in the subcostal vein of *Dakruma* noted above. Moreover, authentic specimens of *grossulariæ* do not appear to possess this character of *Dakruma*. I am, therefore, of opinion that a study of sufficient material from both continents will prove the two specifically identical, or at the most that our American insect is a variety, and that *Dakruma* will not obtain. Packard is of this opinion, as in the later editions of his *Guide* the species is called *Myelois convolutella*.

PENTHINA VITIVORANA Packard (Rep. I, p. 133).—This is identical with a European insect having the same habits. It was first described over a century since by Schiffermiller & Denis as *Tortrix botrana*, and has been referred to various genera since, and finally to *Eudemis* Hübn., so that the insect should be known as *Eudemis botrana* (Schiff.). *Conchylis ambiguella* (Hübn.) has very similar habits in Europe. See Nördlinger's "Die Kleinen Feinde der Landwirthschaft," p. 424 ff. It is the *Lobesia botrana* of the later editions of Packard's *Guide*.

EURYPTYCHIA SALIGNEANA Clem. (Rep. II, 134).—This according to Prof. Fernald, who has seen the type, is the same as Clemens's *Hedya Scudderiana* (Proc. Acad. Sci. Phila., 1860, p. 358), the description of which is very brief and presumably taken from a female. The genus *Euryptychia* (Proc. Ent. Soc. Phila. V, 140) is founded on the male, which has a broad fold extending to the middle of costa on the primaries and covering up a pencil of yellowish hairs. Zeller subsequently redescribed it as *Pœdisca affusana* (Beiträge, etc., pt. III, p. 101 [307]). From a comparison of female specimens I am led to believe that this is the same species that is commonly known in Europe as *Spilonota roborana* Schiff., though in Staudinger and Wocke's Catalogue *cynosbana* Fabr., described in 1875, is given the priority and *aquana* Hübn. is placed as a synonym. The obliquity of the edge of the basal dark patch and the details of the occellated spot upon which species have been separated, I find to be variable.

The insect in Europe is known to feed on the leaf-buds of the rose. I have abundant proof that in this country it is not a gall-maker, but, as was inferred in the Report, an inquiline. I have found its larva feeding upon the flowers as well as amid the terminal leaves of the Golden-rod, and have also found it in other galls. When feeding in the more exposed positions it generally has a carneous or rosy tint.

ANCHYLOPERA FRAGARIÆ W. & R. (Rep. I, 142)—This has been referred to *Phoxopteris comptana* Fröhl., and while the two very closely resemble each other, Prof. Fernald informs me that he yet believes *fragariæ* to be distinct.

TORTRIX CINDERELLA Riley (Rep. W. p. 47).—From specimens rared from cranberry-feeding larvæ received from Mr. Jno. H. Brakeley, of Bordentown, N. J., I am satisfied that this is the same species briefly characterized by Packard in the 1st edition of his *Guide* (p. 334) as *Tortrix oxycoccana*, and that *T. malivorana* LeBaron (my Rep. IV, p. 47) is but a dimorphic orange form, subsequently described by Packard as *T. vacciniivorana* (Hayden's Report of the U. S. Geol. and Geogr. Survey of the Territories 1878, p. 522). The orange and ash-gray specimens are thus bred both from Apple and Cranberry. I have reared both forms from Cranberry and from Apple, and they are undistinguishable in the larva and pupa states. The gray form is often more or less suffused with orange scales and the orange form less frequently with gray scales. This is the most remarkable case of dimorphism with which I am familiar in the family, and points strongly to the important bearing of biological facts on a true classification. The dimorphic coloring is not sexual, but occurs in both sexes. The eggs of this species are very flat, circular and translucent, with a diameter of 0.7^{mm}, and are laid singly on the underside of the leaf near the mid rib. The species belongs to the genus *Teras*, and as Packard's specific name *oxycoccana* has priority, the insect should be known as *Teras oxycoccana*, Pack. The insect, according to Mr. Brakeley, who gives an account of it in the Report of the Seventh Annual Convention of the New Jersey Cranberry Association (1879, p. 7), commonly affects, also, the high-bush whortleberry. The gray form of the moth is most frequent in autumn.

ŒTA COMPTA, Clem. (Rep. I, p. 151).—Notwithstanding Mr. Grote doubts the identity of this insect with Cramer's *Phalæna punctella*, there is no question in my mind about it and I entirely agree with Zeller, who makes also the *Tinea pustulella* Fabr. a synonym. (Beitr. z. Kenntn. N. A. Nachfalter II, p. 28). It was first described in this country in 1856 by Fitch as *Deiopeia aurea* (3rd Rep. Ins. N. Y., p. 168). See also "Zygænidæ and Bombycidæ of N. A.," by R. H. Stretch, 1872, pp. 159 and 241.

The egg of this insect is one of the most singular Lepidopterous eggs with which I am familiar. I have found it numerously in the South in midsummer. It is 0.9^{mm} long, soft and plastic so as to be variable in form; but when laid (as it often is) on the web which the young larvæ make, where it takes on the more natural form, it is ovoid, somewhat compressed, with frequently a median ridge and one end narrowed and produced into a short neck. The color is cream-yellow and the delicate shell is corruguate. It is laid singly and generally slightly attached by the broad side to the side of the mid-rib of the tenderest leaves, and its contact (by virtue, doubtless, of some poisonous liquid with which it is laid) causes a well defined swelling of the leaf-vein.

The species is placed among the *Zygænidæ* in Grote and Robinson's *List*, and has evidently more affinities therewith than with the *Teneidæ*.

SOME NEW VARIETIES OF CATOCALÆ.

By G. H. FRENCH, Carbondale, Ill.

Besides the varieties named by Mr. Hy. Edwards in his excellent paper in Vol. 3 of the Brooklyn Bulletin, it seems to me the following are not only sufficiently separate in their markings from the usual forms, but also constant enough to warrant giving them varietal names, and I therefore propose the following:

CAT. LACHRYMOSA, Guen.

Var. Evelina, n. var.

This form is the opposite of var. *Paulina*, Hy. Edw. The basal third of the primaries, the whole of the posterior or inner margin, and the terminal space, is suffused with deep brownish black. This is broken in the middle of the terminal space, this dash and the rest of the wing being of the usual color. Described from 3 specimens.

CAT. LACHRYMOSA, Guen.

Var. *Zelica n. var.*

This form bears the same relation to the usual form that var. *Phalanga*, Grote, does to *Cat. Palæogama*, Guen. The space between the t. p. and the subterminal lines, and a shade inside the t. a. line, deep brown black. The rest of the wing is no darker than many of the ordinary forms. Described from 3 specimens.

CAT. INNUBENS, Guen.

Var. *Hinda, n. var.*

I would apply this name to that form in which the primaries are marked with deep brown from the base to the apex, usually suffusing the costal half of the wing except the pale apical patch. This patch and the posterior part of the wing are lighter than in the ordinary form. Rather more than half of those taken here are of this form.

AN ANNOTATED CATALOGUE OF THE DIURNAL LEPIDOPTERA OF THE ISLAND OF CUBA.

(BASED ON KIRBY'S SYNONYMICAL CATALOGUE.)

By SENOR DON JUAN GUNDLACH.

FAMILY I.—NYMPHALIDÆ.

SUB-FAMILY I.—DANAINÆ.

Genus 3. DANAIS. Latr.
27. *D. Erippus.* Cr.
27 a. *D. Gilippus.* Cr.

Kirby considers these two species as varieties, or one species in transition, but this is not certain. Not only the perfect insect is differently colored, but also the caterpillars are very different.

Genus 7. LYCOREA. Dbly.
2. *L. Ceres, var Dimeter.* Feld.
Genus 22. ITHOMIA. Hbn.
140. *I. Cubana.* H. Sch.

SUB-FAMILY II.—SATYRINÆ.

Genus 46. CALISTO. Hbn.
2. *C. Herophile.* Hbn.

SUB-FAMILY VII.—HELICONINÆ.

Genus 1. HELICONIUS. Latr.
46. *H. Charithonia.* L.
Genus 2. EUEIDES. Hubn.
13. *E. Cleobæa.* Hb. Zutr.

SUB-FAMILY VIII. NYMPHALINÆ.

Genus 1. COLAENIS. Hbn.
6. *C. Delila.* F.
Genus 2. DIONE. Hubn.
3. *D. Vanillæ.* L.
Genus 4. CLOTHILDA. Blanch.
1. *C. Pantherata.* Mart.
1 a. *C. Numida.* Hbn.
4. *C. Cubana.* Salv.
Genus 11. EUPTOIETA. Dbly.
2. *E. Hegesia.* Cr.
Genus 14. PHYCIODES. Hbn.
19. *P. Frisia.* Poey.
41. *P. Pelops.* Drury.

Kirby mentions also *Anocaona* (*Anacaona* Poey), but this name is a synonym of *Pelops.* Dr.

Genus 17. COATLANTONA. Kirby.
16. *C. Peresi.*(Gundl.) H. Sch.
Genus 21. HYPANARTIA. Hbn.
6. *H. Paullus.* F.
Genus 23. PYRAMEIS. Hbn.
1. *P. Atalanta,* L.
8. *P. Cardui.* L.
9. *P. Virginiensis.* Dr.
Genus 24. JUNONIA. Hbn.
12. *J. Lavinia.* Cr.
= *Zonalis.* Feld.
12 b. *J Genoveva.* Cr.
Genus 29. ANARTIA. Hbn.
1. *A. Jatrophæ.* L.
2. *A Lytrea.* Godt.
Genus 36. EUNICA. Hubn.
1. *E. Tatila.* H. Sch.
38. *E. Monima.* Cr.
53. *E Heraclitus.*

In Kirby's catalogue this sp. is referred to Poey, but Poey does not mention it in *loco citado.* The author is Eschscholz.

Genus 43. DYNAMINE. Hubn.
23. *D. Egæa.* F.
27. *D. Mylitta.* Cr.
Genus 52. GYNÆCIA. Doubl.
1. *G. Dirce.* L.
Genus 59. LUCINIA. Hubn.
2. *L. Sida.* Hubn.
Genus 63. MEGALURA. Blanch.
4. *M. Chiron.* F.
(18. *M. Poeyi.* Lucas.)

This is a synonym of *Anæa Echemus* Doub, and should be omitted from the list of the species of this genus.

20. *M Eleucha.* Hubn.
Genus 64. VICTORINA. Blanch.
1. *V. Steneles.* L.
Genus 65. HYPOLIMNAS. Hubn.
1. *H. Bolina.* L.

Kirby does not indicate America. All the localities mentioned are in the other hemisphere.

Genus 76. ADELPHA. Hubn.
6. *A. Basilea.* Cr.
Genus 93. APATURA. F.
31. *A. Druryi.* Hbn.
33. *A. Idyja.* Hbn.
Genus 98. AGANISTHOS. Bdv.
1. *A. Odius.* F.
2. *A. Acheronta.* F.
Genus 99. PREPONA. Bdv.
12. *P. Antimache.* Hbn.
Genus 109. HYPNA. Hubn.
1. *H. Clytemnestra.* Cr.
var. Iphigenia. H. Sch.
Genus 110. ANÆA. Hubn.
2. *A. Troglodyta.* F.
5. *A. Echemus.* Dby.

See note on Genus Megalura.

Genus 111. SIDERONE.
1. *S. Ide.* Hubn.

FAMILY II.—LEMONIID

SUB-FAMILY I.—LIBYTHÆINÆ

Genus 1. LIBYTHÆA. F.
L. Terena. Godt.

FAMILY III.—LYCÆNIDÆ.

Genus 10. CUPIDO. Schrank.
65. *C. Isopthalma.* H. Sch.
67. *C. Hanno.* Stoll.
68. *C. Ammon.* Lucas.
69. *C. Cassius.* Cr.
Genus 13. THECLA. F.
228. *T. Celida.* Lucas.
302. *T. Martialis.* H. Sch.
305. *T. Simæthis.* Dr.
306. *T. Mæsites.* H. Sch.
347. *T. Coelebs,* H. Sch.
373. *T. Limenia.* Hew.
(Suppl.) 407. *T. Angelia.* Hew.
(") 441. *T. Cybira.* Hew.
Genus 38. EUMÆUS. Hubn.
3. *E. Atala.* Poey.

FAMILY IV.—PAPILIONIDÆ.

SUB-FAMILY I.—PIERINÆ.

Genus 5. DISMORPHIA. Hubn.
26. *D. Spio.* Godt., *var. Cubana.* H.Sc
Genus 10. EUREMA. Hubn.
1. *E. Nicippe.* Cr.
2. *E. Proterpia.* F.
4. *E. Gundlachia.* Poey.
33. *E. Lisa.* Bdv.
36. *E. Palmyra.* Poey.
39. *E. Elathea.* Cr. (?)
43. *E. Conjungens.* H. Sch.
44. *E. Jucunda.* Bois.
=. *Ebriola.* Poey.
=. ♀. *Albina.* Poey.
46. *E. Dina.* Poey.
50. *E. Laræ.* (Gundl.) H. Sch.
51. *E. Citrina.* Poey.
54. *E. Messalina,* F.
55. *E. Gnathene.* Bdv.

Kirby gives the last two numbers as distinct species, but they form but one, and *Bulæa,* Bois, is a synonym of the same. I have noted them as follows in my collection:

Terias *Messalina.* Fab. Mant. (1787) Kby, P. 445.
" *Gnathene.* Bdv. Spec. 46 (1836). Kby, P. 445
" *Bulæa.* Bdv. Spec. 47 (1836). Kby, P. 446.
" *Arabella.* Hbn. Zutr. 1837.
" *Iradia.* Poey. Mem. Cuba, 1831.

The whole of these five names are referable to one species.

56. *E. Lucina.* Poey.
56 a. *E. Fornsi.* Poey.
56 b. *E. Cubana.* H. Sch.
(57. *E. Bulæa.* Bdv.)

See note on *E. Messalina,* above.

65. *E. Amelia.* Poey.
Genus 11. PIERIS. Schrank,
87. *P. Monuste.* L.
Genus 11 b. DAPTONOURA. Butl.
6. *D. Salacia.* Godt.
10. *D. Ilaire.* Godt.
Genus 15. CATOPSILIA. Hbn.
6. *C. Eubule.* L.
12. *C. Thalestris.* Hubn.

Kirby appears to believe that *C. Thalestris* and *C. Avellaneda* are but little different. On the upper surface they have some resemblance, principally in the ♀, but the lower surfaces are entirely unlike.

12 a. *C. Avellaneda.* H. Sch.
14. *C. Argante.* F.
C. Agarithe. Bdv.

On page 484 Kirby's Catalogue the last named is given as a variety of *C. Argante.* But there is a very great difference on the under side of the upper wings, the oblique brown band being always broken in *Argante* and entire in *Agarithe*. The ♀♀ differ more than the ♂♂.

20. *C. Statira*. Cr.
21. *C. Neleis*. Bdv.
24. *C. Godartiana*. Swain.

Genus 16. KRICOGONIA. Reak.
1. *K. Lyside*. Godt.

Genus 17. GONEPTERYX. Leach.
2. *G Mærula*. F.

Genus 19. MEGANOSTOMA. Reak.
1. *M. Cesonia*. Stoll.

Genus 25. NATHALIS. Bdv.
1. *N. Iole*. Bdv.

SUB-FAMILY II.—PAPILIONINÆ.

Genus 21. PAPILIO. L.
19. *P. Villersii*. Godt.
25. *P. Polydamas*. L.
120. *P. Gundlachianus*. Feld.
147. *P. Androgeus*. Cr.
155. *P. Thoas*. L.
Var. *Cresphontes*. Cr.
Var. *Oviedo*. Gundl.
158. *P. Cresphontinus*. Mart.
161. *P. Andræmon*. Hbn.
162. *P. Caiguanabus*. Poey.
163. *P. Oxynius*. Hubn.
164. *P. Pelaus*. F.
268. *P. Celadon*. Lucas.
325. *P. Polyxenes*. F.

FAMILY V.—HESPERIDÆ.

Genus 1. THYMELE. F.
23. *T. Santiago*. Lucas.
24. *T. Marmorea*. H. Sch.
27. *T. Proteus*. L.
48. *T. Vespasius*. F.
Var. *Cassander*. F.

In a letter to me, Mr. Hoppfer states that Herrich Schæffer has named my No. 357 *Achylodes Cassander*. F. Now, *Cassander* in H. Sch. is a *Goniloba*, and *Gesta* is a *Nisoniades*. But the question remains: Is my 357 = *Vespasius*. F?

Genus 2. TELEGONUS. Hubn.
2. *T. Talus*. Cr.
17. *T. Xagua*. Lucas.
23. *T. Habana*. Lucas.
32. *T. Maysi*. Lucas.
33. *T. San Antonio*. Lucas.

Genus 17. ERYCIDES. Hubn.
27. *E. Batabano*. Lucas.

Genus 18. CARYSTUS. Hubn.
9. *C Tripunctus*. H. Sch.
49. *C. Corydon*. F.

Genus 19. PROTEIDES. Hubn.
7. *P. Cunaxa*. Hew.

I believe that *P. Alameda*, Lefeb, is = ♂ of *P. Mesogramma*, Poey. If so, the name of the sp. should stand as *Alameda*, because the *Mesogramma*, Poey, is not the anterior *Mesogramma*. Latr. (fide Kirby) and the name *Cunaxa* Hew, is posterior to *Alameda*.

8. *P. Antiqua*. H. Sch.
19. *P. Corrupta*. H. Sch.

Genus 20. PAMPHILA. F.
1. *P. Ethlius*. Cr.
26. *P. Sandarac*. H. Sch.
65. *P. Sylvicola*. H. Sch.
66 a. *P. Coscinia*. H. Sch.
78. *P. Phylæus*. Dr.
81. *P. Radians*. Lucas.
82. *P. Amadis*. H. Sch.

I believe that *P. Baracoa*, Lefeb. and *P. Amadis*, H. Sch., are synonyms. The name *Baracoa* is anterior.

83. *P. Magdalia*. H. Sch.
84. *P. Mayo*. H. Sch.

Pamph. Misera, Luc. (Lefeb.) and *P. Mayo*, H. Sch., are one species, the name *Misera* being anterior. *Misera* is the ♂, *Mayo* the ♀.

145. *P. Malitiosa*. H. Sch.
157. *P. Philemon*. F.

I believe with Herrich Schæffer that the following names are synonyms, and represent the ♂, viz.:

Philemon, F., 1775.
Flyas, Cr., 1782.
Velasquez, Lefeb., 1856.

but Kirby adds the name *Arcas*. Dr. 1773, which is preferable, being anterior.

165. *P. Cubana*. H. Sch.
166. *P. Singularis*. H. Sch.
168. *P. Cornelius*. Latr.
170. *P. Amyntas*. F.
175. *P. Alameda*. Luc.

See remarks on *P. Cuxana*. (ante.)

179. *P. Baracoa*. Luc.

See remarks on *P. Amadis*. (ante.)

211. *P. Misera*. Lucas.

See remarks on *P. Mayo*. (ante.)

Genus 23. THYMELICUS. Hubn.
10. *T. Nanus*. H. Sch.

Genus 24. HESPERIA. F.
40. *H. Syricthus*. F.
40. *H. Crisis*. H. Sch.

Genus 44. NISONIADES. Hubn.
13. *N. Zarucco*. Lucas.
14. *N. Potrillo*. Lucas.
15. *N. Braco*. H. Sch.
16. *N. Undulatus*. H. Sch.
17. *N. Brunnea*. H. Sch.
18. *N. Concolor*. H. Sch.
32. *N. Otreus*. Cr.
33. *N. Zephodes*. Cr.

The ♀ of *Arcas* = *Philemon F.*, etc., is the *Otreus* Cr. (1782), which is = *Zephodes*, Hubn. We have observed these frequently in copula. *N. Brunnea* H. Sch., is very near to this, but properly separated by its author. I note in my collection several differences which prove their distinctness.

Genus 45. ACHYLODES. Hbn.

4. *A. Gesti*. H. Sch.
See note on P, *Vespasius*. (ante.)
5. *A. Papinianus*. Poey.
18. *A. Velasques*. Lucas.
26. *A. Arcas*. Dury.
See note on *P. Philemon* (ante.)

In a letter to Mr. Henry Edwards, dated May 13th, 1881, Señor Gundlach says;

"The work of Sagra (part Lepidoptera,) mentions many species never found by Poey and myself in Cuba. You will read what M. Guerin and Sr. Sagra say in the introduction to the Spanish edition (I do not know if their remarks are also found in the French edition,) on the collection brought from Cuba, and mixed by M. Lefebvre with the Lepidoptera of the Antilles in general. When Mr. Lucas began to work upon them he found no indication that a species was surely from Cuba, and in this uncertainty, he has enumerated a great number of species never discovered in the Island." Sr. Gundlach adds the following valuable information on the species of Diurnal Lepidopt. mentioned in Sagra's work.

Apatura Theodora. Lefeb. = *A Pavonii*, Latr. Not observed by me.

Thecla Marius. Bdv. ined. Not observed by me, or perhaps = *T. Limenia*. Hew.

Thecla Pasco. Lefeb. Not observed by me.
" *Aon*, Lefeb. " " " "

The. *T. Aon*. Lefeb. (?) by H. Sch. Corrb. 1864, p. 165, is not the *T. Aon*, typus, but

T. Celida. Bdv. ined, in Sagra.

Thecla Celida. Bdv. ined. is my 119. — *Th. Aon*. Lefeb. ? of H. Sch.

Thecla Tollus. Bdv. ined. Not observed by me, or perhaps my No. 116, which is = *T. martialis*. H. Sch.

Lycæna Theonus. Lefeb. is in Kirby's Catalogue the same as *L. Amnon*, but it is *Ly. Cassius*.

Lycæna Astinida. Bdv. ined. not observed by me. Lucas, in the Spanish edition, says *Astinida, not Astinidas*.

Eudamus Sumadus. Lefeb.
" *Trinidad*. Lefeb.

I have not observed these two species, nor have I seen *Eudamus Capucinus*. Lefeb. unless it be *Telegonus San Antonio* Lucas.

Telegonus Xagua. Lucas. (Kirby, page 573, No. 17) should be *T. Jaqua*.

Nisoniadas Potrillo. Lefeb. (Kirby Page. 629, No. 14).

The name of the mountain is Potrerillo, not Potrillo.

Nisoniades Zarucco. Lefeb. is named from the town Jaruco, not *Zarucco*.

Kirby indicates as species of Cuba on page 607, No. 203, and p. 608, No. 223, the two following species:

Hesperia Labeo. Poey. cent. Lep. 1833, and Sagra, 1857.

" *Ulpianus*. Poey. cent. Lep. 1833, and Sagra, 1857. but Poey does not indicate the country as Cuba. For *Labeo* he says "Elle habite * * *" and for *Ulpianus*, "Brezil."

P. Utha. Hew. descrip. Hesp. 1868, page 37, Cuba.

P. Palæa. Hew. l. c. page, 31, Cuba.

I do not know these species.

Thanaos Paterculus. H. Sch. Corrbl. 1863. (Kirby, p. 629, No. 12.)

"Herrich Schæffer does not mention this species in 1864 in his Catalogue of the Lepidoptera of Cuba."

DESCRIPTIONS OF SOME NEW SPECIES OF HETEROCERA.

By Henry Edwards.

FAM. SPHINGIDÆ.

SPHINX LIBOCEDRUS. n. sp.

At first sight looking like a small example of *Sph. Oreodaphne*, but differing greatly when carefully examined. Color the same as that of *Sph. Chersis*, with the same black dashes upon the primaries, that along the median nervule, which is frequently wanting in *Oreodaphne*, and sometimes in *Chersis*, being here well defined and reaching almost to the base of the wing. The ground color of the secondaries is a clearer white, and the median black band stands out in stronger contrast than in either *Chersis* or *Oreodaphne*, while the grey dorsal space of the abdomen, traversed by a black line, is narrower than either of the other forms, and the demi-band comparatively larger, and clearer white. In *Chersis* and *Oreodaphne*, the thorax has the tegulæ edged inwardly with black, in the form of a long triangle. In *Libocedrus*, this mark is present, and in additition, the tegulæ themselves have a distinct black streak, reaching to the base of the head, not observable in either of the others. The under side of the wings is paler grey, with the median band of the secondaries very strongly marked.

Exp. wings. 2.50 inch.

1 ♂. Prescott, Arizona. (W. Howard.)

Type. Coll, Hy. Edwards.

SPHINX UTAHENSIS. n. var.

In the collection of Mr. B. Neumoegen, are two examples of a Sphinx, allied to *Sph. drupiferarum*, but if a variety of that species, it possesses characters, apart from its great size, to which attention may be called. It is altogether of a greyer cast, without any of the pinkish yellow tint seen in *drupiferarum*. The primaries preserve the resemblance to the well known species, the median band of secondaries is much broader, straight, and not waved on its outer edge. It terminates also on the costa nearer to the base than in *drupiferarum*. The abdomen is a darker grey, and the white demi-bands are reduced to small oblong blotches. The example is a ♀.

Exp. wings. 4.50 inch.

S. Utah.

The average size of six examples ♂. ♀. of *Drupiferarum*, in my collection, does not exceed 3.60 inch.

FAM. ZYGÆNIDÆ.

ANATOLMIS FULGENS. n. sp.

Size of *A. Grotei, Pkd.*, but differing from that species by the primaries being of a bright crimson tint, without the slightly orange shade observable in the well known species. The secondaries are wholly black, with the exception of a very narrow costal streak, rosy red. The thorax also is black, with only the anterior edge of tegulæ crimson, while in *A. Grotei* the thorax is wholly yellowish crimson. Underside same as the upper.

1 ♂ Prescott, Arizona. (W. Howard.)

Type. Coll. Hy. Edwards.

FAM. BOMBYCIDÆ.

THYRIDOPTERYX MEADII. n. sp.

A singular little species, differing from *T. ephemeriformis* in the more slender body form, the less hairy body clothing, and the whiter and clearer wings. The nervules are pale orange, instead of brown, and there is no trace of the hairy clothing of the abdominal margin of secondaries so observable in *Ephemeriformis*. The wings are narrower in proportion, and want the shining gloss of the well known species. The larval case is much more cylindrical than that of its congener, being nearly of equal breadth throughout. In other words, it is not swollen in the middle, and is much smaller than the average size of *Ephemeriformis*.

Exp. wings, 1.00 inch. Length larval case, 1.25 inch.

1 ♂ Mohave Desert, California. (T. L. Mead.)

Type. Coll. Hy. Edwards.

FAM. NOCTUIDÆ.

ORIBATES VERSUTUS. n. sp.

Size of *O. limbatus*, and resembling it in the form of its markings, though remarkably different in its coloration. General color, rich golden brown. Basal space, deep brown; subbasal space, deep ochreous, shaded with brownish. T. a. and t. p. lines almost parallel with each other, and enclosing a narrow space, very rich golden brown. The spots are obsolete. Behind the t. p. line the wing is again dark ochreous, shaded heavily with deep brown, and the same purplish tinge. Secondaries blackish, with the fringe paler. Beneath, the whole wings are golden brown, flecked with darker color, and the discal spots prominently marked on both wings. The costa of primaries has three small golden spots.

1 ♀ N. W. Texas. (J. Boll.)
Type. Coll. B. Neumoegen.

ORIBATES OPIPARUS. n. sp.

Fawn drab. Basal region reddish, with some faint blackish waved lines most apparent on costa. T. a. line very broad, nearly straight, blackish brown; beyond this, on costa, a small brownish triangular spot, and a larger one at the costal termination of the almost obsolete t. p. line. Reniform, blackish. Posterior margin and fringes, blackish brown, less conspicuously so at the apex. The insect is elsewhere wholly fawn-color.

Exp. wings, 0.60 inch.
1 ♂ Texas. Type. Coll. E. L. Graef.

NOTE.—I learn, through the kindness of my friends, Mr. A G. Butler and Prof. C. V. Riley, that the generic name *Oribates* has been previously employed in the Class INSECTA as that of a group of Crustacea. I am therefore compelled to change it, and I propose to substitute for it that of *Gyros*. The species described by me will therefore be known as

Gyros Muirii.
" *versutus.*
" *limbatus.*
" *opiparus.*

With the exception of *G. Muirii*, the genus is an extremely homogeneous one, but I am inclined to think that *Muirii* differs in generic characters, and that it ought, perhaps to form the type of another genus. The proper position of the group is, I think, near to *Eustrotia.* Hbn.

CATOCALA EMILIA. n. var.

A remarkable form of *C. Lachrymosa*, in which the whole of the base, the half of the internal margin, and the apex of the primaries are dull black, leaving only the middle third of the costal space to a point below the median nerve, and a streak along the posterior margin, grayish olive. The lines are indistinctly seen, and the reniform is almost obsolete.

1 ♂ Newburgh, N. Y. (Miss Emily L. Morton.)

CATOCALA MIRANDA. n. sp.

Allied to *C. Levettei*, Grote, and probably confounded with it in collections. It is, however, smaller, with the primaries of a clearer grey, and with the lines sharper and more distinct. The t. a. line is oblique, and very slightly dentated, reaching the internal margin at a point very near the middle, and almost connected there with the t. p.. line, which runs into a long tooth on the lower sub-median nervule. The reniform is well defined, gray surrounded by a whitish cloud. Secondaries black, with the fringes clear white, thus presenting a strong point of difference from *C. Levettei*. The thorax has the collar brown, and well marked. Underside smoky brown, with the apices, a sub-marginal band on the primaries as well as the fringe of secondaries white.

Exp. wings. 1.75 inch.
Washington, D. C.
Type. Coll. Hy. Edwards.

This interesting species was presented to me by Mr. A. Koebele, who saw two other examples in the collection of Mr. H. Schönburn. With the exception of *C. tristis*, Edw. this is the smallest of the gray and black group known to me.

SYNEDA OCCULTA. n. sp.

Allied to S. *graphica*. Hubn., but differing in its darker color, and the arrangement of markings of the secondaries. The primaries have the brownish shade of *S. adumbrata*, Behr., and are very similar to that species. They want the stone colored shade of *graphica*, and the whole of the lines and shading is much heavier. The t. a. line is much more regular, not toothed, but slightly angled in the middle, and very heavily shaded posteriorly with brown-black. The t. p. line is also nearly straight in its outline, very slightly sinuate inwardly about the centre, leaving the median space about equal width on the costal and internal margins. It is edged anteriorly with yellowish brown. The sub-oblong pale patch beyond the t. p. line is nearly the same shape as in *adumbrata*, and not so long as in *graphica*. It has a deep obtuse tooth outwardly, where it is bordered with dark brown, and joins the t. p. line at the median nervule. The submarginal space is deep fawn-drab, and the fringe is the same color. Secondaries rather dull orange, a darker shade than in *graphica*, and not so vivid as in *adumbrata*. The base is wholly clouded with brownish, giving it a dull appearance. From the middle of costa down to the anal angle, runs a rather broad, dusky, black band almost straight, and from the middle of this runs a branch of equal width, to near the apex, thus forming a distinct Y. The marginal border is rather broad, slightly sinuate, and the fringe is whitish, clouded with dusky. Beneath, the general ground color is dull yellow. Costal edge of primaries, a large inverted wedge-shaped discal spot, a submarginal band, broad on costa, and narrowing to a line on the internal margin, and the moderately wide posterior margin, all black. Secondaries, with basal third of costa, a sub-oblong discal spot, a broad, waved and dentated median band, and the apical half of margin black. These marks are all separate and independent of each other. Thorax, abdomen and legs greyish brown, flecked with white; the abdomen yellowish at the tip.

Exp. wings, 1.60 inch. 1 ♀ Texas. (J. Boll.)
Type. Coll. B. Neumoegen.

SYNEDA FACETA. n. sp.

Primaries dull stone drab, with slightly leaden tint. Basal line almost obsolete, reduced to a few brownish scales. T. a. line rounded inwardly in the middle, forming a rather deep sinus, edged with brown. T. p. line begins on costa, at a space about three lines from the apex, and encloses the usual pale dentated spot. It is furnished with two teeth, directed posteriorly, and when it reaches the median nervule turns abruptly and directly to the middle of the wing below the reniform, and here forms a deep tooth; thence it runs obliquely, but without any deflection or dentation, direct to the internal margin. The median space thus enclosed by the t. a. and t. p. lines is much larger than usual, and is remarkably wide on the costal margin. Behind the t. p. line is a row of seven pale grey spots, being the broken-up sub-marginal line. The t. p. line itself is bright golden brown. Margin and fringes concolorous. The whole surface of the wing is flecked with blackish scales. Secondaries deep orange; the basal half of costa broadly black; apical half of posterior margin also broadly black. Near the apex, a longitudinal black band, interrupted near median nervule, leaving the centre of the wing orange. In a line with this, resting on anal angle, is another longitudinal black dash. Abdominal margins broadly shaded with black. Beneath, the ground color is sordid white. Middle of primaries, dusky black—this shade joined at internal margin to the sub-marginal band, which, with the posterior margin, is also dusky black. Secondaries, with a rosy shade along the abdominal margin, the markings of the upper side being strongly repeated. Thorax, abdomen and legs, greyish brown, flecked with black.

Exp. wings, 1.40 inch.
1 ♂ Indian River, Florida.

SYNEDOIDA VALENS. n. sp.

General color, stone drab, as in most species of the genus.

Basal and median spaces slightly flecked with whitish scales. Basal line rich brown, not reaching to the internal margin. T. a. line even, not dentate, but bent in a nearly right angle in the middle, the apex of angle directed posteriorly. This line is shaded rather heavily with brown at its centre. T. p. line runs from costa very obliquely to the 2nd sub-costal nervule, where it runs into a sharp point, turns abruptly back, forming a deep tooth, the other angle of which rests on the median nervule. Then a small truncate space, slightly dentate, and another indentation almost back to the median nervule, and near to the centre of the wing. The line then passes with a slight deflection, obliquely to the internal margin. This line is very broadly edged with deep brown, especially on the indentations. The space enclosed by the t. p. and t. a. lines bears a fanciful resemblance to a sculptured head, cut off above the forehead, the brownish, oblong reniform appearing as the eye. The sub-marginal line is a little paler than the ground color, and there are seven black dots on the margin at the termination of the nervules. Secondaries without any marks whatever. Underside, stone drab, flecked with blackish scales, a little yellowish on the costa of both wings. Thorax and abdomen concolorous.

Exp. wings. 1.80 inch.
1 ♂. Kanab, S. Utah.
Type. Coll. B. Neumoegen.

FAM. GEOMETRIDÆ.

GORYTODES PERSONARIA. n. sp.

Closely allied to *G. uncanaria* Pack., but differing from that species by the peculiar markings of the primaries. The brownish median space is much narrower on the costa, and does not reach so far towards the apex as in *uncanaria*. It is far less acutely toothed at the beginning of the anterior line, there being in the present species only a simple tooth at the middle, *i. e.* on the median nervule. The posterior line is, however, more decidedly dentate, having throughout its length three distinct teeth. The sub-marginal line is heavier than in *uncanaria*, and is more sinuate. The primaries are less falcate than in the common species. Beneath, the whole surface is free from markings, being almost concolorous, with fleckings of brownish scales on a gray ground.

Exp. wings. 1.25 inch.
1 ♂ Summit, Sierra Nevada, Cal. (H. E.)
I have little doubt that this species exists in many collections

as *G. uncanaria*, but it needs only a comparison to separate them.

ZERENE ELEGANTARIA. n. sp.

The ground of the wings is clear white, with a glossy surface. The anterior and posterior lines are pale orange bordered with a series of black sub-ovate spots on each side, between the nervules. The anterior line is somewhat similar, and the yellow streak runs along the costa to the base of the wing. The posterior line is rather straight on costa, to the 2nd sub-costal nervule. Thence it runs obliquely to the centre of the wing at the sub-median nervule, and then almost straight to the internal margin. In the median space, and reaching to the costa, indicating the central discal spot, is a circular mark of pale orange, edged with black spots as in the lines, and with the centre white, surrounded by black spots. The marginal intronervular spaces have a series of black crescents, and on the margin of secondaries is a faint row of more linear marks, while the costal margin exhibits some indistinct black blotches.

On the underside, the markings are faintly repeated.

2 ♂. 1 ♀. Tucson, Arizona. (R. H. Stretch.)

Exp. wings. 1.20 inch.

Type. Coll. Hy. Edwards.

At the suggestion of my friend, Mr. A. R. Grote, I place this exquisite insect near to the well-known *Z. Catenaria*, but it may herafter prove the type of a new genus. In its system of coloration, it somewhat recalls the very dissimilar *Abraxas grossulariata*. L. of Europe.

AZELINA MORRISONARIA. n. sp.

Under this name I call attention to a very remarkable form of this genus, taken by Mr. Morrison in Washington Territory. It differs very widely from any example I have ever seen of *A Hubneraria*, Gne., and though I know well the tendency of that species to strongly marked varieties, I cannot but think that the present form is distinct. The ground color is a decidedly ochreous tint, particularly so on the posterior margins, and the bands stand out in very strong relief. The anterior line is deeply toothed nearer to the costa than in *A. Hubneraria*, and becomes obsolete before reaching the internal margin, while the posterior line is decidedly straighter, or less sinuate than any example of *Hubneraria* I have examined. The irrorations over the surface of the wings are, in consequence of the paler ground color, much more distinct than usual, as is also the oblique band of the secondaries.

Under side similar to *Hubneraria*.

1 ♂. Washington Territory, (H. K. Morrison.)

Type. Coll. B. Neumoegen.

CORRECTIONS.

In my paper in PAPILIO No. 5, on Species of Nisoniades, the following corrections are to be made.

On page 70, last line, for spot's read spots.

On page 72, line 4, transfer " in the Middle and Eastern States," to end of line 22.

On page 73, line 4, *cæspitabis* (an error for *cæspitalis* of the MS.) read *cæspitatis*, and *dele* foot-note of the page. In giving the correction to the Edwards' Catalogue, I had followed Boisduval's *Lep. de. la Californie* (1869), Edwards' Synopsis (1872), Morris (1860 and 1862), Scudder, Kirby, *et al.* Mr. W. H. Edwards has subsequently informed me that he finds the species to have been originally published by Dr. Boisduval in the *Ann. Soc. Ent. Fr.*, in 1852, as *cæspitatis*. As there appears to be no necessity for the terminal change to *alis* made by Dr. Morris in the Smithsonian publications in 1860 and 1862, by the author himself in 1869, and adopted by subsequent writers, the name as originally given, will have to be retained. J. A. LINTNER.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] September, 1881. [No. 8.

REPORT OF THE PROCEEDINGS WITH REFERENCE TO "LEPIDOPTERA," OF THE ENTOMOLOGICAL SECTION OF THE AMERICAN ASSOCIATION FOR ADVANCEMENT OF SCIENCE.

The Entomological Sub-section of the American Association met at Cincinnati, on 18th, 19th and 20th of August, 1881. There were present Rev'd Dr. Jno. G. Morris, Chairman; B. P. Mann, Secretary; Prof. A. J. Cook, Prof. S. H. Peabody, Dr. H. S. Jewett, Chas. Dury, C. G. Siewers, V. T. Chambers, W. H. Edwards, Prof. J. A. Lintner, Prof. Cyrus Thomas, J. Duncan Putnam, Prof. C. V. Riley and others.

The first paper on Thursday, 18th, was read by Mr. Edwards, giving an account of the peculiar habit of Heliconia *Charitonia*, Linn, as observed and communicated by Dr. Wm. Wittfield, of Indian River, Fla. In two instances a group of the butterflies of this species, three or four in number, were found clinging by their legs firmly to a chrysalis of the same species, and they remained there, resisting attempts to frighten them away, for two days or more, until the imago issued from the chrysalis, when the butterflies departed.

This relation elicited much interest and was discussed by several of the members. Some thought the gathering of the butterflies might be caused by sexual desire, the imago being perhaps of the opposite sex from the butterflies. Others thought that the butterflies, knowing well their own immunity from attacks of birds or animals, by reason of obnoxious fluids or smell, had come to discover that their presence protected from attack the naked and defenceless chrysalis, at a time when protection was most needed, namely, just before the issuing of the imago.

The other papers read related to other branches of Entomology than the Lepidoptera, and therefore are not reported for PAPILIO.

Mr. Edwards exhibited a box of butterflies, embracing Limenitis *Arthemis*, called by Mr. Scudder in his recent book, "Butterflies" 1881, the White-banded Purple, and *L. Ursula*, called the Red-spotted Purple, and requested an opinion from the members as to the color of these insects. The group is called "Purples" by Mr. Scudder. The members were unanimous that the specimens were black or brown-black, and not purple. One gentleman thought he discovered a purple flush to *Arthemis* when looked at sidewise, but was of the same opinion as the rest as to the ground color. It was agreed that the name was a misnomer.

On Friday, Mr. Edwards read a paper on the Length of Life of Butterflies, showing from his own notes made during a period of 15 years, last past, that with the summer butterflies the duration of life was measured by weeks, depending on the period when copulation took place in the male and oviposition in the female, shortly after which events the sexes expired. A butterfly three weeks old was aged, and if any lived longer they were the males who had been unable to find mates. As to the hibernating butterflies, the history of Danais *Archippus* was related in full from special observations made, and it was shown that the duration of life could at most be from September to about first of June of the following year, and that the first eggs of the year were laid by the hibernating females, who at once disappeared after finishing their laying. That the broods of this species followed in quick succession to the number of three or four at least, and that the eggs were laid by young females, but a short time from chrysalis. This was directly opposed to the statements of Mr. Scudder, first set forth in Psyche in 1875, and recently in "Butterflies," 1881, that *Archippus* lived from 12 to 15 months; laid no eggs till after hibernation, and then laid all along through the summer, so that the caterpillars formed during the summer were from these eggs only. In fact that this species had changed its habits from that of its kind, and bred much after the fashion of a mammal.

After this paper Prof. Lintner read one on the Life Duration of the Heterocera, in which he gave the result of his own experience—15 days to 3 weeks as the limit of life of the imago. Mr. Lintner suggested that good service might be rendered science by the collation of published records, and the publication of data respecting appearance of species of insects.

This paper was followed by a discussion of the whole subject by members. Dr. Jewett was emphatic as to there being at least three broods of *Archippus* in Ohio, and he had repeatedly observed that the eggs were laid by females evidently not long from chrysalis.

Prof. Riley related his experience in Missouri and other States. He agreed with Mr. Edwards on the facts in the history of *Archippus*, but also believed that the species did not hibernate at all in the Northern States, but migrated as far to the South as Missouri, or Virginia, returning again in the Spring to the North more or less; and he suggested that this fact might have led Mr. Scudder into such errors as he has published about this species.

In the afternoon session Prof. Lintner read a paper on A Remarkable Invasion of Northern New York by a Pyralid Insect: relating that during May, 1881, St. Lawrence Co., N. Y., was much overrun by a new sort of army worm, causing vast destruction and threatening much more, when they disappeared by going to ground. By obtaining cocoons he ascertained when the moths came out that they were the little species *Crambus Vulgivagellus*, one which had never before been known to be an injurious insect.

Mr. Edwards read a paper on The Alleged Abnormal Peculiarity in the History of Argynnis *Myrina*: showing from careful observation that the history of both Arg. *Myrina* and *Bellona*, as related by Mr. Scudder in the Am. Nat., 1872, and repeated in "Butterflies" is wholly incorrect, and that these species are not at all peculiar, but like other two or three-brooded species in their behavior.

On Saturday, 20th, the papers read were upon other insects than Lepidoptera. In the informal discussion that closed the meeting Prof. Peabody related some observations that led him to believe the life period of certain Heterocera to be very short—scarcely reaching a week.

Mr. Edwards mentioned that Thecla *Henrici* laid its eggs in the wild plum, placing them at the base of the plum stalks, on upper side. That the caterpillars on emerging from the eggs travelled up the stalks and fixed themselves on the young plums, eating out a round cavity the diameter and depth of the head at first, and continuing to feed upon the inner part of the plum, avoiding the seed, growing as the plum grows. They spend most of the time with head and next two segments in the plum, coming out to moult, and changing to another plum when the first one is completely excavated. They hibernate in chrysalis, and the butterfly comes forth in the Spring when the plum trees are beginning to bloom, being a one-brooded species.

The meeting adjourned Saturday noon to meet in 1882 at Montreal.

NOTE ON AGROTIS REPENTIS.

BY A. R. GROTE.

Having recently added to my books of reference on Entomology a copy of Harris's original report, I went again over the descriptions of the Noctuidæ. The common species first illustrated and described as *Agrotis Repentis* G. & R., Trans. Am. Ent. Soc., Vol. I, Plate VII, I had since identified, but now I believe incorrectly, with Harris's *Agrotis Messoria.* It was redescribed as *Agrotis Cochrani*, by Prof. C. V. Riley, when accounts were given of its destructiveness in the Missouri Reports. The moth is found across the continent. Californian specimens are somewhat larger than the Eastern ones, and at first I thought they might belong to a different species. They showed some resemblance to Herrich-Schaeffer's figure of *Lycarum*, to which species I doubtfully referred them. Subsequent collections showed the presence of undoubted *Repentis* in Colorado, and no doubt remains on my mind, that we have to do with a single widely distributed species, and one that is of interest as being injurious to the labors of the agriculturist.

I have not been able to find the species in Harris's collection, in the Cabinet of the Boston Society of Natural History; nor have I seen the type of *Messoria*, but I think it hardly possible that the two can be the same species. Harris's description of his species, in his original Report, p. 324, is as follows:

" The reaping rustic (*Agrotis messoria*) as it may be called, is the representative of the corn rustic (*Agrotis segetum*) of Europe. The fore-wings are reddish gray, crossed by fine wavy blackish bands, the first two of which, and generally the fourth also are double; the two ordinary spots, and a third oval spot near the middle of the wing are bordered with black. The hind wings are whitish, becoming dusky brown behind, and have a small central crescent and the veins dusky. The head and thorax are chinchilla-gray; the collar is edged with black; and the abdomen is light brownish-gray. It expands 1 $^4/_{10}$ inch.

From this it is clearly impossible that *Repentis* can be the species. The *reddish-gray* primaries, the *whitish* hind-wings, the *chinchilla-gray* thorax, all point to another species, viz.: *Agrotis scandens*, Riley. I have elsewhere noted the variation of this light-gray species, which has a tint of red, more or less noticeable on the fore-wings. I have collected it in July on the flowers of the milk-weed, near Buffalo. Some specimens have a very high blush of red.

Whether we can refer *Scandens* to this species of Dr. Harris's or not, must, perhaps, be considered uncertain, until Harris's type be found. But we cannot consider *Repentis* as *Messoria* any longer. This species I took with me to Europe in 1867, and could not identify it in the collection of the British Museum. M. Guenée had received it from Canada in a collection which reached him just before my visit to Chateaudun. In conversation he suggested the name *Repentis* for the species, and I told him that we should call it by this name when we illustrated it.

The correction should be made in my recently published list of our species of *Agrotis*, and the name *Repentis* restored. The description of Dr. Harris is repeated on page 444 of the Third Edition of his Report. Prof. Riley's *Cochranii* should keep the place, to which I have assigned it, as a synonym of *Repentis*.

In my collection are several forms of *Agrotis*, which more or less closely resemble *Repentis*. Among these are *Rubefactalis*, which has the markings and dusky fuscous ground color of *Repentis*, but has a distinct rusty, or reddish shading over thorax and fore-wings. It is from Washington Territory. Then there is *Friabilis*, a small species from Canada, which has the markings quite obliterate. It is colored like *Repentis*, of which it may be a small form or variety. Another species is *Pleuritica*, from Canada, which has the male antennæ more deeply pectinated, but the markings are much like *Repentis*. The color is a little brighter and ochrey. Other species, chiefly from the West, which approach *Repentis*, are: *Balanitis*, *Fuscigera*, *Brunneigera* and *Micronyx*.

Whether *Segetum* is an American species is doubtful as yet. I have described a species, many years ago, as *Texana*, and figured it, which I have thought since might be *Segetum*. My type is probably in Philadelphia, and I have had no second specimen to compare. I have seen what may be the species in a collection from Colorado, sent to me to name by the Rev. Mr. Hulst. It is not improbable that the Texan species and the one from Colorado should be the same, since the two localities have other forms in common. It is also known that in California and Texas there are instances where the same species occur, and at the same time not in the Eastern States. Such examples are *Orthosia Posticata* and *Heliothis Cupes;* while two of the Texan species of *Ammoconia* are found also in Arizona.

In the Missouri Reports I have found that most, if not all, of the new noctuidæ there described as new were, in reality, known to science; and Professor Riley's names must be added to the synonymy of previously described species. They are as follows:

Agrotis Cochranii, Riley is A. REPENTIS G. and R.

Agrotis Scandens, Riley may be A. MESSORIA H.

Acronycta Populi, Riley is A. LEPUSCULINA G.

Prodenia Autumnalis, Riley is LAPHYGMA FRUGIPERDA A. and S.

Xylina Cinerea, Riley is X. ANTENNATA, Walk.

Plusia Brassicæ, Riley may be P. NI. Hubn.

As to this last, it is difficult to believe that the American form is distinct from the European. Specimens of the two "may be undistinguishable" according to Prof. Riley's subsequent remarks. The characters given to separate the two are those of variation. Again, that the species occurs from Canada to Alabama, and westerly to California, may not have been known or considered. But the principal difficulty in considering the two distinct lies in the fact that, while the species is essentially distinguished by the male abdominal tufts, in this the European and American specimens agree. Like *Pieris*, the moth may have followed commerce. It has of late years been quite abundant on Staten Island.

The above are, I believe, all the new Noctuidæ in the Missouri Reports. Among the identifications of Noctuidæ, in the same Reports, the following are erroneous: *Prodenia Commelinæ* Riley is not Abbot and Smith's species, but *Lineatella* of Harvey. (It is possible that *Flavimedia* and *Lineatella* are sexes of one species.) Again the *Agrotis Jaculifera* of Prof. Riley includes *Agrotis Tricosa* of Prof. Lintner, and, perhaps, *Agrotis Herilis* Grote.

But the value of Reports on Insects injurious to agriculture is hardly affected by incorrect scientific names being used. The main point is, that the species should be clearly described, together with its habits. I have always deprecated the custom of interlarding the text of such Reports with technical discussions on matters connected with synonymy.

NOTES ON SOME NORTH AMERICAN LEPIDOPTERA.

By Arthur G. Butler.

(*Continued from p.* 103.)

In the present part of my paper I shall make a few remarks upon the Bombyces sent to us by Mr. Edwards; these consist of eighteen recognized species.

I commence with the *Cossidæ*, since I feel satisfied that this family, both in the habit of the larva and the complicated neuration of the imago, shows distinct affinities to the typical *Castniidæ*; the form of the wings more nearly approaches the *Sphingidæ* (compare *Morpheis smerintha;* see also Herrich-Schäffer's Auss. Schmett. figs. 150-153, species of the same genus). It is true that the antennæ in some of the genera resemble those of *Lasiocampidæ* or *Notodontidæ*, but this, I take it, is due to reversion to an ancestral character.

I therefore would locate the *Cossidæ* between the Sphinges and Castniæ.

XYSTUS ROBINIÆ. *Peck.*

This is a singularly *Sphingiform* species, somewhat resembling *Macroglossa*. The example sent is rather dwarfed, but still shows the character of the genus. It is well illustrated by Herrich-Schäffer, (Auss. Schmett., fig. 170). The genus *Xyleutes* of Hübner, to which Packard referred this species, consists of perfectly heterogeneous forms and, therefore, Mr. Grote's *Xystus* must be adopted, but I cannot, on that account, call it *robiniæ* Grote, any more than of Packard. This interchange of authors may be satisfactory to workers in the United States, but it causes us endless trouble here by obscuring the true authorship of the specific name, which to us is of far more importance than the generic. I heartily wish, and so does every Englishman on this side of the water, that American authors would reconsider their system of adopting other persons' children. In daily life such a course would be a heavy tax upon their own patience (and probably their pockets). In Entomology the burden falls upon their brother students.

AGARISTIDÆ.

ALYPIA SACRAMENTI. *Grote.*

Some of our examples of *A. langtoni* approach very close to this; perhaps, as Mr. Stretch says, the example of *A. sacramenti* is "larger," but not so appreciably larger as some specimens of *A. langtoni* are than others. The individual sent to us is from Colorado.

ALYPIA RIDINGSII. *Grote.*

A good, distinct species, allied to *A. macculochii*, which we have from Hudson's Bay. Mr. Edwards has sent us a pair of *A. ridingsii* from the summit of the Sierra Nevada.

COPIDRYAS GLOVERI. *Grote.*

This species interests me much from its close relationship to the Indo-African genus *Ægocera*. The primaries in *Copidryas* are, however, more Noctuiform. One specimen from Arizona.

ZYGÆNIDÆ.

GNOPHÆLA HOPFFERI. *Grote* and *Robinson.*

One specimen from California.

It would be interesting to compare the larva of this species with that of *Pericopis*. Unless I am much mistaken they would be found to be very nearly allied. (Compare figure of *P. catilina*, Cramer, Pap. Ext. 1, pl. 79, figs. E. F., which is referable to the sub-genus *Phaloe*, Guérin).

The genus *Pericopis* and its allies are *Arctiidæ*, but *Gnophæla* (for what reason I know not) was referred by Walker to the *Zygænidæ*, and has ever since remained there. It is true that the two families completely run together, so that one can only fix the boundary line between them in the most arbitrary manner, but for all that, the typical *Zygænids* of South and Central America (the home of the family,) generally possess more distinctly Liparidiform larvæ than do the *Arctiidæ*, giving one the impression that a boundary line must exist somewhere. Although for convenience of reference I retain *Gnophæla* in the *Zygænidæ* I am quite prepared to hear that it is a true *Arctiid.*

GNOPHÆLA VERMICULATA. *Grote* and *Robinson.*

A male from Colorado.

This species appears to come nearest to *G. equinoctialis*, a female of which from Mexico I found associated with *Pericopis* in our collection. It also somewhat resembles the male of *P. aglaura*, Cramer, but the secondaries in *Gnophæla* are a little narrower than in *Pericopis.*

DAHANA ATRIPENNIS. *Grote.*

A specimen from Florida. The genus appears to me to come nearest to *Syntomeida*, but the body is less robust.

ARCTIIDÆ,

SUB-FAM. CTENUCHIINÆ.

CTENUCHA RUBROSCAPUS. *Ménétriés.*

Glaucopis rubroscapus, Ménétriés, Enum Corp. Anim. Mus. Imp. Acad. Sci. Petrop, Lep. 2d partie, p. 142, n. 1679, tab. IV, fig. 7, (1857).

Ctenucha walsinghamii. H. Edwards, Trans. Cal. Acad. Sci. Val. 5, p. 9, (1873); Stretch, Zyg. and Bomb., N. Amer., p. 213, n. 7, pl. 9. fig 1, (1872-73).

Washington Territory and Mt. Shasta.

I have long wondered what difference could exist between *C. rubroscapus* and *C. walsinghamii*, but until now have never compared them, as all the examples hitherto standing in our collection under both names are referable to the nearly allied *C. multifaria* of Walker.

It will be seen by a reference both to the description and figure by Ménétriés that there is no hint of a white costal margin in *C. rubroscapus*, and as this is the only distinguishing character between *C. multifaria* and *C. walsinghamii* the name must necessarily go. The only question in my mind is whether this costal character can be relied on, but of this my friend, Mr. Edwards, will be a better judge than I.

ARCTIIDÆ (typical).

LEPTARCTIA LENA, *Boisd.* = californiæ. *Walk.**

Knight Valley and Havilah, California.

I cannot distinguish the examples sent by Mr. Edwards from our specimens of *L. californiæ*, Walk. They agree absolutely in both sexes.

---

* Nemeophila californiæ, Walk., Cat. Lep. Het. 3, p. 625, n. 3, (1855).

ARCTIA INTERMEDIA. *Stretch.*

Mr. Stretch notes this as "intermediate between *A. virgo* and *A achaia.*" In pattern, however, it seems to me more nearly to resemble *A. Saundersii* than *A. achaia.*

ARCTIA ACHAIA. *Boisd.*, and var. OCHRACEA, *Stretch. Pl.* 5, *figs.* 18 *and* 21.

It seems hardly conceivable that these two insects can be conspecific. The species has been reared, it is true, but the only question in my mind is whether the insects figured on plate 5 of Mr. Stretch's book are all from the same batch of eggs. They seem to me to divide thus, 18-19 *achaia* and 20-21 *ochracea.* Fig. 17 looks like an aberrant female of the latter.

Knowing as one does that species are but local forms, which every year shows to be more nearly allied, until whole genera seem linked in one continuous geographical chain of hardly separable forms, it is necessary to be extremely cautious about associating, under one name, any two forms not proved to be conspecific. I am not speaking specially of the present species, for I do not doubt that my much esteemed friend had abundant evidence before him, but it has become a sort of mania of late years with many men, especially in Europe, to call all allied forms "varieties" or "sports," (for a true variety is nothing more than a sport or abortion), and this mania persisted in will unquestionably in a few years reduce nearly every genus to a single *variable* species in their eyes.

EUCHÆTES COLLARIS. *Fitch.*

Colorado.

We previously only possessed a single example from Georgia.

DIOPTIDÆ.

PHRYGANIDIA CALIFORNICA. *Packard.*

The larva and pupa of this species exhibit no affinity to the family *Zygænidæ* or to the *Psychidæ*. The imago has somewhat the aspect of the semi-transparent group of *Liparidæ*, but in structure it scarcely differs from the genus *Hyrmina* of the New World family *Dioptidæ*. The form of the body, antennæ and neuration are almost identical. The principal difference being that the furcation of the sub-costal branches of the primaries is shorter than in *Hyrmina.* I have no doubt whatever that the genus would be rightly located in this family.

SATURNIIDÆ.

HEMILEUCA NEVADENSIS. *Stretch.*

The genus is, I should say, nearer to *Pseudohazis* and *Eochroa* than to anything else, although the tufted abdomen of the male reminds one of *Lasiocampa*.

PSEUDOHAZIS EGLANTERINA. *Boisd.*

Respecting this species I have nothing to say at present.

SATURNIA MENDOCINO. *Behrens.*

A species quite new to me.

LASIOCAMPIDÆ.

CLISIOCAMPA CALIFORNICA. *Packard.*

This is the palest form known to me.

LIMACODIDÆ.

EULIMACODES SCAPHA. *Harris.*

Limacodes undifera, Walker, Cat. Lep. Het. 5 p., 1149, n. s. (1855).

The example forwarded is from Pennsylvania, but it differs in no respect from Walker's type from Honduras.

TWO NEW HESPERIANS.

C. E. WORTHINGTON.

ENDAMUS OBERON. n. s.

Male, exp. 2.2 inch. Female, 2.4 inch.

Upper side, primaries brown with four irregular, semi-transparent, nearly confluent honey-yellow spots, arranged on a line from costa towards inner angle of wing, a detached yellow spot adjacent to third spot and between it and apex, the usual subapical three spots near costa, fringe concolorous. Secondaries, uniform brown, fringes tawny and without divisions, basal third of both wings, well clothed with tawny hair extending along abdominal margin of secondaries. Secondaries prolonged as in E. Tityrus.

Beneath. Primaries having all markings of upper surface repeated, secondaries with a faintly indicated paler median band extending two-thirds across wing, two faint spots between this and anal angle, and more or less scattering tawny scales, all wings below having a strong purplish reflection and slightly paler on posterior margins.

Body above purple brown, thorax covered with tawny hairs, beneath more or less shaded with fulvous, legs brown, becoming fulvous towards the feet, palpi fulvous. Club brown above, fulvous below and at sides.

Strikingly resembles E. Tityrus on superior surfaces, but the yellow spots are less confluent and more opaque, the general color deeper and fringes not divided by brown on the veins; beneath it differs conspicuously in the more uniform color, the purplish cast and entire absence of the large silver spot so prominent in its ally.

Thirty-one examples, Marco Island, Florida, May, 1881.

ERYCIDES OKEECHOBEE. n. s.

Male expands 2.3 inches.

Upper side deep smoky brown, with a pronounced indigo-violet reflection. Primaries without markings, other than a few scattering blue or green scales about base of wings. Fringes concolorous. Secondaries with a row of brilliant blue or green elongated sub-marginal spots, more or less confluent, interrupted by the veins, and becoming obsolete towards anterior margin, fringes with some white in intervenular spaces.

Beneath, primaries paler and with a purplish cast, a few blue or green scales along the costa, about base and near inner angle of wing. Secondaries much like upper side, but deeper, the purplish reflection at anterior margin, gradually changing to deep indigo as it approaches the abdominal fold; a few blue or green scales in median space, and along abdominal margin, sub-marginal spots as above, but brighter.

Female expands 2.6 inches.

Upper side paler than the male (color of E. Pylades), gradually growing deeper over both wings until nearly black at anal angle, all wings with a faint purplish reflection in certain lights. Markings on secondaries like those of the male. Beneath differing from the male only in paler color, and in having a purple reflection, which is more pronounced than on upper surface.

Body deep brown above and below, some blue or green lines on collar, front and shoulders, and arranged in bands on posterior segments of abdomen. Palpi greenish white. Antennæ dark brown.

Twenty-six examples from Marco Island, Florida, May, 1881.

This form was first brought from Florida by Dr. J. W. Velie, of Chicago, several years ago. I am informed that Mr. Scudder has attached the name Okeechobee to some of these specimens, although I cannot find that he ever described the species, hence I retain the MSS. name. E. Okeechobee has been taken as far north as Indian River.

SOME REMARKS ON THE ALLEGED ABNORMAL PECULIARITIES OF ARGYNNIS MYRINA.

By W. H. Edwards.

[Read before the Ent. Sub. Section of the Am. Ass'n, at Cinn., 19 Aug. 1881].

In Amer. Naturalist for Sept. 1872, Mr. S. H. Scudder published a paper entitled "The Curious History of a Butterfly," which reads thus: "Of all American butterflies, Brenthis (Argynnis) *Bellona* presents the strangest history." Again: "In this genus, at least in B. *Bellona* and B. *Myrina*, occurs a phenomenon which, so far as I know, is quite unique among butterflies: there are two sets of individuals, each following its own cycle of changes, apparently with as little to do with the other set as if it were a different species; each set has its own distinct season and thus gives rise to the apparition of two or three successive 'broods' in the course of the year. At the very end of the season this butterfly will be found laying eggs, which hatch in a few days; the little caterpillars, after devouring their egg shells, refuse further food, and undoubtedly hibernate in this state; * * * This we will term the aestival series, for by the end of the following June, the caterpillars have attained their growth, and passing through the chrysalis state, emerge as butterflies about the middle of July; these are the butterflies of midsummer, continuing upon the wing until the end of September. In this butterfly the eggs are wholly undeveloped at the birth of the female, and in the aestival series are not deposited until September; they hatch in from five to nine days, and the young caterpillars, as we have said, pass directly into a state of hibernation, making the cycle of the year's changes complete with a single generation. The second set of individuals, which we will term the vernal, hibernates as half-grown caterpillars and produces the earliest brood of butterflies; these make their appearance about the middle of May, although they are occasionally seen earlier; they are hardly common before the end of the month, and are as long-lived as their companions of the aestival series; they do not lay their eggs until the latter part of July or early in August, just when the butterflies of the aestival series are becoming common; the eggs hatch and the caterpillars grow as usual, sloughing their integuments twice. Beyond this point all caterpillars do not develop alike: some continue in what would appear the natural way; we will first follow them—it will be to their grave! As caterpillars they eat, as chrysalids they sleep and then appear in September, gay and frolicsome butterflies doomed to an untimely end. Their sisters of the aestival series are busily laying eggs to perpetuate the race (for the phenomenon of midsummer is now repeated inversely, one series ovipositing, the other emerging from the chrysalis), but to them is this boon denied; the cold autumnal blasts sweep them away before the eggs are half developed in their ovaries. It is in fact a vain effort of Nature to develop a second brood, which in a more southern climate, with a longer season, would prove successful.

But we have said that this was the history of some only, and this fact proves the salvation of the vernal series; when about half grown, in the middle of August, while the weather is still hot, a portion of the caterpillars suddenly cease to eat and fall into a state of lethargy; * * * * they do not arouse themselves until the following spring, when they again resume the cycle of changes peculiar to the vernal series, and by this extraordinary habit preserve its history.

Here we have two independent series in the same species, each single-brooded, but one making an effort toward a second generation, invariably ending in disaster; the butterfly may therefore be properly considered as "single-brooded," although differing greatly from other single-brooded butterflies, by presenting three distinct apparitions of the perfect form. Whether by any lethargic feats, the caterpillars of the two series ever unite their faces (*sic*) and finally have a synchronous and parallel development, we are as yet unprepared to say; but that the blood of both series ever commingles through the union of the perfect insect is very improbable, because, although the generations overlap, the males of a brood are the first to disappear, and at best there would be few that could thus mate; moreover, since the eggs of the freshly enclosed females are not fully developed for weeks, or even months, the effect of such a union would be questionable; yet if there is no union between the two series, then are the vernal and æstival groups practically as distinct from each other as any two species!"

Mr. Scudder quotes the late H. Doubleday, showing that the habit of Argynnis *Euphrosyne*, of Europe, a species closely allied to *Myrina*, and belonging to the same sub-section of the genus, did not agree with his conception of *Myrina* and *Bellona*, and comments thereon as follows: "By this account the *butterflies lay their eggs on their first appearance;* either they differ in toto from their congeners in America, or there is some error in this statement." (Doubleday's). Mr. Doubleday was a lepidopterest of eminence and it was strange Mr. Scudder did not suspect the error to be in his own statement. Truly the foregoing was a curious history!

In Canadian Entomologist, Vol. 7, p. 189 et seq, 1875, I showed that the essential facts, namely, as to the eggs, in the foregoing relation were misconceived, the conclusions reached were unwarranted, and the history of these species could not differ from that of any other two-brooded species. Subsequently, in Can. Ent., in 1876, 1877, I continued the history and gave the facts which were at variance with Mr. Scudder's theory in several points, and I thought that ended the matter. I should not again have referred to this Curious History, had not Mr. Scudder in his recent work, "Butterflies," 1881, reprinted almost word for word his original statement, with no direct reference to the counter statements I had made, and unsupported by any further observation of his own or of any one. He has struck out the assertion that "the eggs are wholly undeveloped at the birth of the female;" but says, page 145, in speaking of the unhappy individuals of September, before mentioned: "It is, however, possible that some of them may lay eggs, which hatching, produce larvae which at once hibernate, and the following year become members of the aestival series. It appears more probable, however, that it is a vain effort of nature to develop a second brood, which in a more southern climate, with a longer season, would prove successful." And adds in a foot note, "Since this was written, some facts have come under my own and others' observations, leading to the belief * * * * that the butterflies of this brood" (*i. e.*, the last one in September, not any other of the series) "lay eggs at once."

Inasmuch as I had shown clearly that the females of several broods of *Myrina* were found on dissection to be filled with developed eggs when they emerged from chrysalis, and that in one instance, in midsummer, scores of eggs were laid by a female just out of chrysalis, it is something surprising that only "some facts since this was written," *i. e.* just before 1881, we may suppose, "*lead to the belief*" that the females of the *last brood* and that only, *may perhaps*, lay eggs soon after they emerge from chrysalis, though the author doubts if they do.

It will be noticed that the structure built up so ingeniously by Mr. Scudder is based upon this assumption:—"that the eggs are wholly undeveloped at the birth of the female;" "not fully developed for weeks or even months;" in consequence of which one of the two broods, described as æstival and vernal, cannot unite with the other, though *both broods may overlap* and be *flying at the same time. Here are females of the vernal brood emerging from chrysalis while those of the æstival are ovipositing*, as expressly stated; the eggs of the æstival having ripened *after the butterfly has been eight or ten weeks out of chrysalis.* The vernal females must go along some months (the author says about three months in the Curious History, but changes to about two months in "Butterflies,") before their eggs are developed, and by that time the males of the æstival brood are understood to be dead, as "the males of a brood are the first to disappear."*

It is stated also—but this is of secondary importance to the preceding statement—that the æstival brood lays eggs in September, which hatch presently and the larvæ from them *go at once into lethargy*, while in the vernal brood the eggs are laid in July and August, and the larvæ from these last reach 2d moult and then all hibernate. It follows, if this be so, in Mr. Scudder's view, that these hibernators will have the earliest start the next spring, and will reach chrysalis and butterfly some weeks before the others who spent the winter in the egg. They get such a start in fact that the others cannot overtake them; though why so long-lived butterflies as these are asserted to be could not bridge over the gap of a few weeks, and the two broods be able to commingle, does not clearly appear—especially as individuals of the same generation breed irregularly., and all the preparatory stages are irregular as to duration, so that some weeks elapse between the first appearance of the earlier and later butterflies. But the author is sure the broods do not commingle and that each goes its own way "as distinct as any other two species." Each is asserted to be one-brooded only, though it is allowed that there is an *appearance as of three annual* broods, and the author has thought out as intricate a theory as that of Ptolemy to account for these apparent motions. The simple statement that the sun and not the earth was the centre of the system cleared up all difficulties in the one case, and the simple fact that the females of these butterflies lay eggs, or may do so, almost as soon as they emerge from chrysalis ought to relieve all doubt in the other. I assert that they do this, and that one generation follows another in direct succession from spring to fall, and that the mysterious appearance of three broods is accounted for without cycles and epicycles.

Now to the proof. I was at Hunter, New York, in the Catskills, at an elevation of from 1650 to 2000 feet above the sea, in July, 1875. The climate there is like much of New England, and any butterfly there we may be sure would behave just as it would do in Massachusetts or New Hampshire. Between 20th and 25th July I obtained many eggs of *Myrina* by confining the females in a bag over plants of violet. The caterpillars from these eggs began to pupate 27th August, and the butterflies to emerge 3d September. On 4th September 3 ♀ 2 ♂ came out, and this is evidence to show that the females emerge as early as the males in this species, contrary to one of the assumptions of Mr. Scudder. By 9th September 25 butterflies had emerged, and *none of the larvae had gone into lethargy*, as it was declared they were in the habit of doing. On dissecting newly emerged females, they were found to be full of nearly mature eggs. These were distinctly ribbed and shaped as when laid.

---

*This is contrary to my experience. I believe the females of all butterflies die shortly after laying their eggs, while many males, perhaps from not having found their mates, continue on the wing quite as long as any female.

In Can. Ent., Vol. 8, p. 161, and Vol. 9, p. 34, I continued the history. In 1876, I went to Hunter again, earlier than before, and was there from 7th June to 1st July; consequently I was able to observe the first generation of *Myrina* of the year. (In 1875, I had observed the same generation.) The species was abundant when I arrived, and I judged, from the worn examples which I saw, that it had been on the wing at least two or three weeks earlier. Mr. Scudder says the first generation appears in May, and I have no doubt it does. On 19th June, I confined 2 ♀, and obtained 60 eggs. The first butterfly from these emerged 15th July. Other females gave eggs 27th June, and as I brought the caterpillars from these last to Coalburgh, and watched all their stages, I will speak only of them. The first butterfly emerged 23d July, the last 31st July, in 8 to 15 days after the butterflies had begun to emerge from the eggs laid 19th June. All these, of course, were of the same generation of butterflies of the year, namely, the second. The first 11 butterflies of this lot proved to be females, and several of the last to emerge were females; and of the whole number the larger part were of that sex. On dissecting one of them nearly mature eggs were found, as in 1875.

On 27th July, I turned loose 6 ♂ 6 ♀ of this lot of butterflies, all which had emerged during the preceding night, and about nine o'clock the same morning, I discovered a pair in copulation in the grass near my house. I left them in quiet for about an hour, and then, by placing the inner edge of the net carefully by them, the female climbed up dragging the male with her. From the net they were transferred to a box and left. By 6 A. M. next day they had separated, and I thereupon confined the female over violet. Within an hour several eggs were laid, and within 48 hours 93 were laid. The eggs began to hatch 4th August. I again went to Hunter, arriving on 18th August, and carried with me some of these caterpillars. They all went on to chrysalis and butterfly, the first butterfly, a ♂ emerging 1st September. On 2d September a ♀ emerged, and on dissection was found full of eggs.

I found *Myrina* flying on my arrival, and 21st of August obtained eggs in the usual way. These hatched 29th, and the larvæ, which according to Mr. Scudder should at once have gone into lethargy, passed their second moult. By 20th September, after that moult, all had become lethargic. I got another lot of eggs 8th September, or 17 days later than the first. These hatched 22d September, and a week later, on the 15th September, I got more eggs, so that this generation was at least ovipositing from 21st of August to 15th September, or during 24 days. On 2d October, still at Hunter, I recorded in my notebook, "Cool weather, but no frost yet. Of the two broods of *Myrina*, all are lethargic, after second moult." The caterpillars of the third and last brood, from eggs laid 15th September, had passed first moult when I left the mountains, and died before I reached Coalburgh a few days later. Now if any caterpillars of this species ever become lethargic at once from the egg, it would have been these last broods.

Let us summarize these observations and see what result. In June I found the first generation of butterflies of the year flying, and they had been out some weeks. This is Mr. Scudder's "vernal brood," and which he says do not (because they cannot—their eggs not developing for a long time yet—) lay their eggs until the latter part of July or early in August. I, however, did obtain eggs from them on 19th and on 27th of June, and the females laid as soon as confined over the food plant, and abundantly. The first butterflies from the eggs of 19th of June emerged 15th July; the first from the eggs of 27th June on 23d July, and the last one on 30th July, so that from these two females of the vernal brood, butterflies in next generation were issuing through 16 days. Now as *Myrina* had been flying a good while before I reached the mountains, the difference between the emerging of the first and last members of the second generation would have been at least a month, or during all July, we may say. These July butterflies are Mr. Scudder's "æstival brood." He says that brood emerges about the middle of July, and "are the butterflies of midsummer," *only his æstival brood is not descended from his vernal.* They can't be because the vernal are *physically unable to lay eggs.* They are descended from those September caterpillars which went in lethargy direct from the egg, and so have consumed the spring and early summer in maturing.

Therefore we have got both vernal and æstival on the carpet by middle of July, and it would save me from as perplexing a study as a Chinese puzzle, if they would commingle and go about their business. But, as alleged, that is impossible. The vernals are only just getting in condition to lay their eggs, and the æstival, which have been emerging in July, have got to struggle along many weeks yet before their time comes.

To continue: I got eggs, laid 20th July, of females of the second generation, or Mr. Scudder's "æstival brood," and all gave butterflies from 3d to 6th September. All of these which were to be of any avail in keeping up the species should, according to the theory, have stopped at the third larval stage and gone into lethargy. *But none at all did so.* Next, eggs laid 21st August, plainly by females of the third generation in direct descent, but which Mr. Scudder would make out to be his æstivals just come to the fore, gave caterpillars wihch did go into lethargy, *not direct from the egg*, however, as theoretically it was their duty to do, *but after second moult*, by 20th September.

Eggs laid 8th September of same generation, gave caterpillars which went into lethargy after second moult, before 2d October, and eggs laid 15th September, of same generation, gave caterpillars which passed first moult and died before second.

Here then are three annual generations of *Myrina*, in the Catskill Mountains. The first, proceeding from the hibernating caterpillars which reached their second moult in the fall, was on the wing at least during the whole month of June. The second, proceeding from the first, was on the wing all July, running a little into August. The third, proceeding from the second, was on the wing the last half of August and part of September, and from them came the caterpillars, which hibernating at second moult, produced the May and June butterflies the next year.

Everything here given is written down in my note book, written from day to day just as it occurred, and I merely make a transcript from it. There is no trusting to memory or incomplete memoranda, and no guessing.

Three annual generations, each on the wing a month at least, all the females capable of laying eggs shortly after emerging from chrysalis, the eggs wanting nothing but impregnation when the female came forth! Some of the first generation must have been flying when individuals of the second generation began to appear, and some of the second when the third began to appear; and as almost invariably the females taken in copulation in all species of butterflies where I have been able to make observations, are fresh from chrysalis, or but a short time from chrysalis, while nearly all the males so taken show signs of considerable age, it follows that the males of one generation may easily mate with females of the next. So that the generations commingle more or less; and this may very probably be the reason why, in *Myrina*, no tangible difference can be discovered between the butterflies of the several generations.

It will also have been observed, that in no case did a caterpillar go into lethargy immediately after the egg; and in no case did a caterpillar, proceeding from any generation but the last one, go into lethargy at all, and then always after second moult. So that all start fair in Spring, and feed and go on to chrysalis and butterfly according to the state of the weather, or according to the locality occupied by each individual. One may be in sunshine while the other is in shade, and in the Catskills or New England, one may be feeding when the other would be unable to find a mouthful,—perhaps has been buried under a snowbank, or has wintered in some cold glen, like the Stoney Clove in Hunter. So that the date of emerging of individuals of the first generation will vary many days, or a month, and this and other influences keep up a similar variation in the generations all the year.

THE LARVÆ OF CATOCALA FLEBILIS AND CATOCALA AMATRIX.

By D. S. Kellicott.

Flebilis.—Two larvæ were taken on the trunk of a hickory *Carya alba*) at Hastings Center, N. Y., July 25, 1881. Length, 58mm., width of body 6.75 mm., width of head and first thoacic segment 4.25 mm., onisciform. The color is gray with a greenish tinge; under a lens it is faintly pink. The dorsal line is rather faint, made up of closely placed lines of black dots; the subdorsal is wider and more conspicuous, on each abdominal ring there is an illy-defined >- or > situated in this line; the stigmatal line or stripe is still more distinct and continuous, the large, black-ringed, elliptical spiracles are situated, except the first, wholly in this line. The papillæ are white, each bearing a fine brown hair; those on the first thoracic ring, however, are dark, or black; on the abdominal rings the posterior pair are situated in the angle of the >- referred to above. The bluish gray head has lines of confluent whitish spots so arranged that the surface has the appearance of watered silk; on the top of the head there are four brown dots placed at the angles of a square. There is a black line extending from the articulation of the jaws half-way up the cranial lobes in front of the ocelli. Head flattened. Feet of the same line as the body, ornamented with black slashes. The lateral fringes are hoary. The ventral surface bluish white with black and flesh-colored spots; thus: the thoracic rings have each an elliptical patch of the latter color; fourth, fifth, tenth and eleventh rings have each a similar black one; the sixth and seventh rings have reddish spots bordered in front with black; rings eight and nine are provided with large spots similar in color without the black border.

One larva spun its loose cocoon among the leaves June 28, and changed to pupa July 1. It was 28mm. long, of the usual form and color. Cremaster armed with eight hooks placed as usual, *i. e.*, the four lower stout ones turned outwards; the four upper weak ones turned towards the median line.

The imago appeared July 27. Expanse 70 mm.

AMATRIX.—One larva was found, Corinna, Mich., July 24, under a large-toothed aspen* (*Populus grandidentata*). Its length at rest, 68 mm., when crawling, 77 mm., width of head, 4.25 mm., width of first thoracic ring, 5.5mm., width of eighth and ninth rings, 9 mm. The usual form. The color gray with a reddish shade, more pronounced at the articulations. The slightly flattened, mottled brown head is more prominent apically than *flebilis;* it is bordered laterally by heavy black lines. The first ring bears above a quadrate patch having the color of the head faintly spotted with white. The dorsal line is quite inconspicuous. The first three rings are strongly wrinkled transversely, the remaining rings have only their posterior third more or less thus wrinkled. The eighth ring has its transverse fold elevated into a light clay-colored protuberance, there is a black splash on either side at its base, at the lower edge of which there is a small black circle with dot at its center. Of the four dots borne on the back of the body rings, the posterior pair is brownish and larger than the anterior; this pair on the eleventh ring become pronounced tubercles, having a black streak passing forward from them just above the spiracles. The hairs from the papillæ are dark. The lateral fringes are pinkish. The ventral surface is white with more or less of black or brown on each ring. On the first three brownish, the patches illy defined, on the succeeding four sharply defined black, largest on the sixth and seventh, on the remaining rings smaller and brownish.

The pupa appeared July 31; the moth August 27. The pupa was 38 mm. long, rather thich. Its color, surface and hooklets of the cremaster as in *flebilis*.

The pupa was quite inactive for one of its genus, when disturbed would not throw itself so violently from side to side as some others do.

PROFESSOR RILEY ON DAKRUMA.

By A. R. Grote.

Although I have carefully studied the characters of a number of genera and species of *Phycidæ*, and, therefore, ought to appreciate any discussion upon them, I confess I do not fully understand Mr. Riley's remarks on "*Pempelia grossulariæ*," in the July number of Papilio, from the Bull. U. S. Ent. Commission. It is really difficult to always understand what is meant by the labial palpi being "recurved" or "porrect," and in this group I have taken the venation, maxillary palpi and antennæ as the basis of genera, *not* the labial palpi. I am accused of describing these latter as "porrect" in *Stenoptycha*, and also of having stated that *Honora* is to be considered as a section of *Stenoptycha.* I have done neither. I do not describe *Stenoptycha* at all, and I say that *Honora* "seems to fall in with a section of *Stenopoycha*" of which I had not the European species to compare. Again, *Dakruma* has other characters which will easily separate it from *Zophodia Bollii* and *Z. dentata*, the only species of that genus I know. I am quite sure that, in naming his species, Dr. Packard did not intend to be as exact as to the genus as might be expected in a paper on special classification, and thus his opinion should not be made use of as by Mr. Riley on this occasion. In working up my material I could not place *Dakruma* among any of Von Heineman's genera and so described it as distinct, and whether the species is European or not, this question is not affected. It is true that Mr. Riley says that some specimens of *grossulariæ* do not "*appear*" to present the character of *Dakruma.* What is meant by "appear?" Do they, or do they not? When more material is brought together the question of *Dakruma* will be settled at some future time, but Mr. Riley will hardly have contributed to the decision by his present remarks. Although I did not think that Professor Comstock's *Dakruma* was congeneric with *grossulariæ*, still, after examining the neuration, Professor Comstock found it identical. It is very probable that the classification of the European species will be considerably changed after the North American are known. This is the case already in many groups of insects and can hardly fail to be so in families like the *Pyralidæ*, *Phycidæ* and *Tortricidæ*, where the European and American forms fit in together. It is less likely to be so with the *Noctuidæ*, where there are large quantities of forms, (*i. e.*, Guenée's *Quadrifidæ*) comparatively wanting in Europe. But in order to come to any scientific opinion in the matter, a certain quantity, at least, of genera have to be studied, and I must refer to the fact that before my paper was published Professor Riley's descriptions in that group (*Phycidæ*, i. e., *Pempelia* (?) *Hammondi*) were made without any vital structural features at all being given; and certainly, by citing such forms as *Grossulariæ* and *Hammondi* under *Pempelia*, Professor Riley showed that he had not at all carefully studied the genera of *Phycidæ.*

---

* Mr. Fischer, of Buffalo, has also bred *amatrix* this summer from larvæ found on the Lombardy poplar.

I thought that Professor Riley's *Grossulariæ* might be a *Homeosoma* when writing my paper. I was reasonably sure the insect could not be a *Pempelia*, but, in the absence of any decisive structural features being given, the drawing and description were not enough to identify the species with *Turbatella.* But when I afterwards found out what species was intended, I at once made the correction in the pages of the *North American Entomologist,* to which article reference should have been made in any further discussion of the matter.

In a group so difficult as the *Phycidæ,* the decision as to what are generic characters should be left to the student who has worked over the largest material ; and any correction of his action, to be of value, must be made from a wider knowledge of the group. So far as I have gone, I am not prepared to reject the venation as a guide to generic relations in the *Phycidæ.* I hope, however, to have an opportunity soon for studying the family with augmented material, and for this purpose would be glad to receive specimens from any locality.

LARVÆ OF TWO SPECIES OF EUCLEA.

By G. H. French, Carbondale, Ill.

E. Paenulata, Clem. In general outline somewhat elliptical, the sides and the back tapering from the middle to both extremities. Length, when full grown, .56 of an inch; width and height, in the middle, nearly .25 of an inch. These measurements were taken when the head was withdrawn beneath the second joint. The body, like others of the genus, destitute of true feet, but locomotion was performed by means of a soft, pliable membrane covering the ventral surface, with which the insect slides over substances instead of walking. General color of dorsum, or dorsal space, dull purplish brown, having under the glass a slight orange tinge. A fine dorsal line, and a broader one each side, which alternately expands and contracts, of dull purplish orange. On each joint, except the twelfth, is a pair of impressed spots, which appear whitish when seen in certain lights.

In the region of the sub-dorsum is an orange ridge containing tubercles, which are covered with spines. These tubercles are of the same color as the ridge, except that between the last two there is a shorter black tubercle without spines. The second and third from each end of the body are larger than the others. A similar tubercled ridge is found in the region of the stigmata except that it does not contain any black tubercles. Sub-dorsal space dull, purplish orange, bordered above and below with purplish brown, each joint containing two whitish impressed spots similar to those on the dorsal space. Below the lower line of tubercles, dull orange.

The single larva from which the above description was taken was found feeding on a willow leaf, September 19, 1880. It pupated September 30, in the manner usual to this group and produced the imago June 17, 1881, a ♀.

E. MONITOR, Packard. In shape and character of markings similar to the preceding. Length .56 of an inch, width .25 and height .19. Color dull, whitish green, the ridge and row of spiny tubercles in the sub-dorsal and stigmatal regions, a little more of a distinct green. Like the preceding species, this larva has a black tubercle without spines in each sub-dorsal row between the last two spined tubercles. The spines on the tubercles are white at base and black at the tips. Like the preceding, each joint, but the twelfth, has on the back and each side two whitish impressed spots. These are surrounded by black lines, formed along the ridges, connected by transverse lines passing between the impressed places. The green on the sub-dorsal ridges is broken in three places by black.

Two of these larvæ were found feeding on oak leaves, the first, September 20, 1880, and the second, September 30. The first pupated October 2, and the other soon afterward. They produced imagines June 12 and 20, 1881, the first a ♂ the second a ♀.

DESCRIPTION OF A REMARKABLE NEW GEOMETRID.

By B. Neumoegen.

ASPILATES VIRIDIRUFARIA. n. sp.

This fine Aspilates has been found by me in a single ♀ specimen in the Greenhorn Mountains of Colorado, in the season of 1880. This season my indefatigable collector, Mr. I. Doll, was fortunate enough to find the ♂ mate of it near Prescott, Arizona.

Looking at it, it reminds one of the much smaller *Chloraspilates bicoloraria*, while it differs in the palpi, being as in *Aspilates*, and in the shape of the wings. It is green and reddish like Bicoloraria, but the head is not concolorous with the green thorax, but of reddish color, and the insect is much larger. In point of ornamentation there is a resemblance to some forms of Coloraria.

Head and primaries are of dark grass-green color, the fringes being reddish, the costal edge likewise having a narrow reddish tint. The lines are obsolete, but below vein 3 there is a brown-reddish irregular transverse band resting on the internal margin, and surmounted by a similarly colored rounded spot in the interspace between veins 3 and 4. In the ♂ this spot tends to form a line with the transverse band.

Secondaries of a dull ochrey red with concolorous fringes and irrorate.

Beneath both wings are concolorous ochrey, irrorate or stippled with red and with discal marks indicated. Abdomen and legs reddish. Head reddish, with the palpi, breast and fore-legs bright, purply reddish.

Expanse 40-43 mil.

Habitat : South Colorado, probably New Mexico and northern Arizona.

Types. Coll. B. Neumoegen.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] October, 1881. [No. 9.

AN AQUATIC NOCTUID LARVA.

Arzama Melanopyga Grote, new species.

BY PROF. J. HENRY COMSTOCK, OF CORNELL UNIVERSITY.

During the month of January, 1880, I found the larva of a Noctuid moth very common in the leaf-stalks of pond lily in Lake Beresford, Florida. The larva bores a hole from the upper side of the leaf into the petiole, which it tunnels in some instances to the depth of two feet or more below the surface of the water. The species was very common, a large proportion of the leaves of the lily in that lake being infested. There was, however, but a single larva in each leaf. When full grown the larva measures from 50 mm. to 70 mm. in length, and it is a little more than 5 mm. in diameter. The color of the dorsal surface is dark olive gray, and of the ventral surface pale olive gray; its head is light reddish brown. Some specimens are much lighter in color, being quite transparent. These larvæ are well known to the people living near the lake, who use them for fish bait, and call them "bonnet worms;" the term "bonnet" being applied to the large leaves of the lily.

From larvæ which I collected at that time and sent to Washington, two moths were reared. These were referred to Mr. A. R. Grote, who determined them as an undescribed species of *Arzama*, and kindly prepared a diagnosis of the species under the name of *A. Melanopyga* for publication in my report as Entomologist of the Department of Agriculture. As I was unable, for want of time, to prepare an article on the subject, I did not include Mr. Grote's description in my report. I now, therefore, in justice to him, hastily pen this note, in order to put on record his description, which I have already withheld too long.

I have recently found a larva in considerable numbers in the leaf stalks of our common yellow pond lily (*Nuphar Advena*) at Ithaca, N. Y., which I believe to be *A. Melanopyga*. These I have now under observation in aquaria in my laboratory. And I hope ere long to be able to give a detailed account of them. I will now briefly record a few of the more interesting points already observed.

The larva is furnished with nine pairs of spiracles, each of which, excepting the ninth, occupies the usual position. The ventro-dorsal diameter of the last segment is much less than that of the remainder of the body, this segment appearing as if the dorsal half had been cut away. The spiracles of the penultimate segment are situated in the dorsal part of the posterior end of the segment; which, on account of the peculiar shape of the last segment, is free. These spiracles are much larger than the others, and are doubtless the ones chiefly used while the larva is in its burrow. The position and direction of these spiracles remind us of the arrangement of the respiratory system in many Dipterous larvæ, which live either in water or masses of decaying matter. Frequently these lily-borers remain with only the caudal tip of the body projecting from the water, evidently using the posterior spiracles as just indicated. They can, however, descend below the surface of the water and remain there a long time. My observations on this point are limited, but I have seen a larva remain entirely under water voluntarily for the space of a half hour. The tracheæ of these larvæ are unusually large. May they not serve as reservoirs of air for the use of the insect while under water?

These larvæ are able to pass on the surface of the water from one leaf to another. This they do with a motion similar to that of a water snake.

Associated with the larvæ of *A. Melanopyga* in Florida, I found another Lepidopterous larva, a somewhat smaller insect, living more upon the surface of the leaf. This species I failed to rear to the adult state.

The following is Mr. Grote's description:

ARZAMA MELANOPYGA, n. s.

♀. Allied to *Vulnifica*, with very similar markings and color, but the thick anal tuft of the female is discolorous and black or blackish. Front unarmed, smooth. This character separates *Sphida Obliquata* from *Arzama Diffusa*, *Vulnifica* and *Melanopyga*. According to Mr. Butler, who has kindly examined Mr. Walker's type of *Arzama Densa* from Georgia in the British Museum, the type of the genus agrees in having the front smooth. The two genera are allied, but the characters of the clypeus are decidedly of generic value in the moths; upon these several genera are founded, and we can thus separate *Ochria* (Gortyna *Led.*) and *Gortyna* (Hydroecia *Led.*). Both *Arzama* and *Sphida* are internal feeders; the chrysalids of *Obliquata* have been taken in stumps under circumstances which lead to the belief that the larva may be a wood-feeder like *Scolecocampa.* The horned clypeus is evidently correlated with function in these internal feeders. In *Melanopyga* the thorax and forewings are dusky yellow; the stigmata concolorous; the lines oblique, uneven, the posterior line dentate, the median shade indicated. In color the lines are dark, with a reddish tinge; the terminal space shaded with dusky without the dentate subterminal line. In color this species is paler than *Vulnifica,* the abdomen more grayish. The hind wings are stained with reddish; in one specimen the border remains grayish. *Expanse* 40 mil. Two ♀ specimens reared by Prof. Comstock from larva boring in leaf-stalks of pond lily. I have a specimen of *Vulnifica* ♀, collected by Mr. Schwarz in Florida with pale anal tuft. I might be inclined to consider the paler color and black anal tuft varietal characters, but the transverse posterior line is less rounded and more acutely angulated below costa in *A. Melanopyga.*

A LITTLE BEAUTY FROM NORTHERN ARIZONA.

BY B. NEUMOEGEN.

SPHINX (HYLOICUS) DOLLII. n. sp.

Head light gray, with two black spots near antennæ. Antennæ brownish with light gray pectinations. Collar light gray, but thorax and patagiæ whitish gray, with two broad dark gray stripes along tegulæ, accentuated with black at their commencement at collar.

Primaries light gray shading off into whitish towards base. Costal edge darker gray. Fringes whitish with darker gray spots alternately at the intersection of the veins. A blackish dash from apex pointing diagonally towards base and fading away in discoidal veins. Two short blackish dashes between 1st and 2d and 2d and 3d median veins, parallel with the neuration.

Secondaries uniform brownish gray with fringes alternately dark gray and white.

Beneath uniform cinereous with the blackish trace of the apical, diagonal dash of primaries. Fringes as above.

Abdomen light gray, with a black dorsal line and black and white lateral intersections at segments.

Expanse of wings, 1.15-16 inch.

Habitat: Prescott.

Type ♂., Coll. B. Neumoegen. This little beauty is gratefully dedicated to my faithful factotum, Mr. I. Doll, who, undaunted by the strain of a torrid zone and the attacks of Indians, pursues his duty of collecting material for our Science.

DESCRIPTION OF THE PREPARATORY STAGES OF THECLA HENRICI, GROTE.

BY W. H. EDWARDS.

EGG.—Shaped like that of *Lycaena Violacea*, flattened and depressed, about this depression the ridges are reduced and the surface is finely reticulated: but elsewhere there is a white frosting of peaks and ridges; color whitish green; this lace work seems to be separable, and in one case where the egg had been rubbed by a leaf, apparently, a film was turned up, and the real surface was seen to be delicate green. Duration of this stage, 5 or six days.

YOUNG LARVA.—Length, 4-100 inch; shape, oval; broadest anteriorly, the base flattened; dorsum high and sloping posteriorly; the summit of dorsum flattened for a little space, and on either side there is a row of long recurved white hairs; along edge of base is another row of similar hairs, bent down; color brownish yellow; head obovoid, and smooth. Duration of this stage, 5 days.

AFTER 1ST MOULT.—Length, 8-100 inch; same shape; segments rounded, but on dorsum rather angular; a red-brown medio-dorsal stripe stopping at 12; on either side of this dull yellow-green, with a macular brown line next outer edge, and limiting the dorsal area; sides sloping a little incurved, red-brown, with a broken yellowish line; a similar but continuous line along basal ridge; whole underside yellow-green; body much covered on upper side with short, stiff, brown hairs; head cordate, smooth, yellow-green. To next moult between three and four days.

AFTER 2ND MOULT.—Length, 12-100 inch; shape as before; the dorsum is considerably elevated, a tuberculous ridge across each segment, from 4 to 11; color red-brown and dull yellow-green; a red medio-dorsal band, tapering to a point posteriorly; through the band runs a green line; outside this band is a green one, containing a little red-brown speck on each segment; sides red-brown, with a green longitudinal line in middle; basal ridge green. To next moult, 5 days.

AFTER THIRD MOULT.—Length, 3-10 inch; greatest breadth 12-100 inch; the dorsum from 4 to 11 presents a series of elevated ridges, one to each segment, narrow in front, broad behind; the summit of dorsum flattened and a little concave, and this is covered by a broad band, cut by a paler line; the remainder of the elevated ridges yellow-green, making a macular green band; sides sloping, nearly flat, red-brown, with an indistinct green line; segment 2 is a broad, elevated rolled collar, in which the head is concealed; 3 has a similar collar in front; basal ridge green, head yellow-green.

One day later, length 4-10 inch: the color has changed to port-wine red, the sub-dorsal area remained yellow-green, but was red-tinted on the posterior part of each segment; the sides same red; a pale red line along basal ridge; about the spiracle a little green; under side diluted wine color; body covered with short brown hair.

One day later, at 5-10 inch; greatest breadth, 19-100; width, 14-100; same color as on previous day.

Still one day later, length 56-100, same color, stopped feeding, and 4 days later fixed for chysalis. In about 24 hours it pupated, at 8 days after 3d moult (as observed).

CHRYSALIS.—Length, 3-10 in.; breadth of abdomen, 2-10, at mesonotum 13-100; height of abdomen 19-100 inch; oval at both ends; the abdomen distended, narrowing anteriorly; the mesonotum rounded and sloping to top of head case; the under side almost straight from end to end; color black or brown black, with obscure red bands; and being on either side a narrow black stripe in middle of abdomen; on mesonotum this stripe disappears and the red remains; whole surface finely corrugated; the dorsum and sides much covered with short hairs, and along the venter is a line of longer ones. The chrysalis will pass the winter.

On 17th of May, 1880, I happened to be standing under a wild plum tree near my house, and with no special motive reached out my hand and plucked a young plum. On this there appeared an onisciform caterpillar with head and some segments of body buried in the side. Feeling sure it was of some butterfly, I searched long for more larva, but found none. I did see one on the plums on another tree which had been partly excavated. This caterpillar was in the penultimate stage, as it turned out, and I raised it to chrysalis, always feeding on the inner part of the plum. The chrysalis died during the winter, and before any color came to the wings of the pupa, so that I had no clue whatever to the species or even the genus. I hoped it might prove to be *Fenesica Tarquinius*, but thought it was a Thecla; it might be *T. Poeas*, rather a common species here, and the food plant of which I had tried in vain to discover.

About middle of April, 1881, Mr. T. L. Mead visited me, and on several days brought in examples of *Thecla Henrici*, and confined some of the females on whortleberry and oak, the former suggested by Scudder's list of food plants, published in Am. Nat., 1869, but got no eggs. On opening one of these females the eggs were found fully formed. Finally it occurred to me to try wild plums, and the bag was tied over the end of a branch still in flower. No eggs were observed till the fourth day, when I found fifteen had been laid in a bunch, all but one at the base of a flower stalk, on the upper side. Although watching these carefully, the branch having been cut off and set in a bottle of water, they hatched when I was not at home, and all but six of the caterpillars were hurt by dropping off. The egg shells were eaten scarcely more than enough to permit egress. To prevent further loss I laid the young caterpillars on the floor of a tin box among some plums, and they soon found the stalks and climbed up. The plums were but just from the blossom and tender enough for so minute a caterpillar. Evidently the eggs are laid just at the right season for the caterpillars to seize the newly-found plums. A little too early or a little too late might be fatal. So also the eggs are laid at just the right spot, on the back at base of the stalk, and instinctively the newly hatched creatures ascend to their food. They grow with the plums, and when the caterpillars are matured the plums are of large size. The attack was made at once on the side of the plum and a hole was eaten out large enough for the head to enter, and thereafter the caterpillar spent most of its time with head in the cavity. I brought fresh plums as often as the old ones wilted, and transferred the caterpillars to them, but from one cause or other, probably from feeding in this artificial manner, all the latter died excepting one. When a moult approached it came out of its burrow and rested either on the side of the plum or on the leaf. At one-quarter inch long, *i. e.*, when half grown, it seemed to have its head and shoulders buried at least from 6 A. M. one day till 9 P. M. the next, with no withdrawal observed by me, and I looked at it frequently. Cutting open the plum the excavation would be found reaching quite across and around the pulpy stone, which in the earlier larval stages was not eaten. But after 3d month this was eaten and the entire plum excavated. In no case was the skin eaten except at the entrance. I placed damson plums in the box, but the wild ones was always preferred.

I am confident that the caterpillar of 1880, before spoken of, was of this species, although the color differed greatly. That was wholly green, in shades, except for two subdorsal brown stripes. The caterpillar of 1881 was port wine red. But they were of same size, same shape, and the habits were precisely alike. In Lycæna *Violacea* some of the caterpillars are nearly white, some are green, and some are wine-red. Perhaps hereafter on raising a brood of the caterpillars of *Henrici* both red and green ones will be found.

The caterpillar of 1880 is described thus:

Mature.—Length 5-10 inch; shape as of *Henrici*, color yellow green, yellow predominating on the sides; the dorsal elevations have the summits yellow, the outsides greenish; the medio-dorsal stripe green, edged on either side by a brown line.

NOTE.—In my Catalogue, 1877, I gave *Henrici* as a marked variety of *T. Irus*. I am inclined to regard the two as distinct species, though nearly allied. Both are found here, and at the time Mr. Mead confined females of *Henrici* over whortleberry and oak, he treated *Irus* in same manner. Also, afterwards, I tried these over plums, but in no case were eggs obtained. Fresh specimens of *Henrici* are of a delicate yellow-green color beneath, and this fades soon after death.

NEW MOTHS FROM ARIZONA, WITH REMARKS ON CATOCALA AND HELIOTHIS.

By A. R. Grote.

The following moths, collected at Tucson, are in the collection of Mr. Berthold Neumoegen. We do not know enough, as yet, of the lepidopterous fauna of Arizona to decide upon its character. There are found within its limits Southern species which we have also from Texas; Western, from Illinois to Colorado; while it offers a number of strange beauties of its own. It will be one of the richest fields for the collector for sometime to come.

In what I have written here as to the conduct of Mr. Hulst, and Mr. Strecker, I have tried to speak for the good name of our science, no less than to vindicate names proposed by myself and insure a correct synonymy.

AMERIA UNICOLOR. Robinson.

Also from Texas. The genus may be referred to the Lithosians, and seems to fall in between *Euphanessa* and *Crocota*. The wing structure is like *Euphanessa;* the color is that of *Crocota*. The ocelli are wanting. I have regarded *Crocota* as belonging to the Arctians, and, in my arrangement, inaugurating that subfamily, the ocelli are present. This species of *Ameria* is frail, unicolorously orange, the wings partially transparent, or subdiaphanous; the antennæ are blackish.

The specimen is from Prescott, as also *Cymatophora Pulmonaria*, and *Grotella Sexseriata*, described in this paper. The others are generally from Tucson.

CHARADARA PALATA. Grote.

♀. The female of this species has the hind wings gray, not white, as in the male type from Colorado.

APATELA EDOLATA. n. s.

♂ ♀. Allied to *Xyliniformis*, but much larger, and darker, shaded with black. Hind wings white, veins a little soiled in the female. Forewings with a white, vivid, acutely dentate, t. p. line, as in its ally. Below the median vein, the wing is shaded from the base outward, longitudinally, diffusely with black, and again from opposite the disc to outer margin. *Expanse*, 38 to 40 mil.

In this form the blackish thorax and primaries are very different from *Perdita*, *Persuasa* and *Afflicta*. The species belongs to another group.

AGROTIS TEXANA. Grote, Proc. Ent. Soc., Phil., 2, Pl. 6, fig. 2.

A specimen from Arizona belongs evidently to this species, though it is less strongly marked than my figure. The fore wings are yellowish brown, the hind wings whitish. The size is about that of *Pastoralis*. Whether this is the same as the

European *Segetum*, is not known to me. I have never seen this species from the East, and it is probably a good species.

PERIGEA LOCULOSA, n. s.

♂ ♀. A Hadenoid form, with naked eyes, untufted abdomen, unarmed tibiæ. Forewings bright and light reddish brown, with the veins streaked with black. The black median lines near together; the inner line sends out an open tooth across the median space, meeting the outer line on submedian fold. The lines meet again on internal margin. Reniform shaded with white, conspicuous. Fringes dark, checkered with pale brown. Hind wings white, translucent, with narrow fuscous edging in the male; shaded with fuscous and with the veins darker in the female. Thorax reddish brown. There are none but the two median lines on forewings, black, edged with pale, not very distinct, the inner median line conspicuous for its strong dentations. *Expanse* 26 to 28 mil. Several specimens. This species recalls, in appearance, the Californian *Graphiphora Perbrunnea.*

HELIOPHILA BICOLORATA, n. s.

♂. Eyes hairy; thorax untufted; tibiæ unarmed. Fore wings and thorax light straw color, immaculate, concolorous. Hind wings and abdomen pale reddish. Beneath the wings are shaded with reddish, like secondaries above. There are no markings whatever. *Expanse* 31 mil.

This species can be confounded with no other, the fore wings are long and rather narrow. It may be catalogued with *Prægracilis* and allies.

Heliophila differs from *Graphiphora*, by the narrow primaries, with their more parallel costal and internal margins, together with the more prominent labial palpi.

GRAPHIPHORA CONSOPITA, n. s.

Eyes hairy. Allied to *Rufula*, from California. The color varies from reddish (♀) to pale clay (♂). The median lines are even, double, faint, pale-lined, wide apart. Wing concolorous, no other than the median lines apparent. Reniform indicated. Hind wings pale, shaded with fuscous. This inconspicuously marked form recalls *Pseudorthosia Variabilis*, but the markings are simpler and less obvious, while the tibiæ are unarmed. *Expanse* 31 to 32 mil.

In this species the ovipositor is visible and the relationship to *Rufula* is evident. But the dotted t. p. line and other markings in which *Rufula* approaches our Eastern *Oviduca*, and leads me to expect that the two may be found to intergrade, are wanting in *Consopita*. The difference in color may be varietal or sexual.

BASILODES CHRYSOPIS, n. s.

Smaller than *Pepita*, paler and less brilliant. Eyes naked; front projecting, with a clypeal depression. Primaries pale yellowish, with a golden luster terminally, especially over subterminal interspace. Spots small, paler than the wing, rounded; reniform with a black point. Lines indistinct, thread-like, in their general course like those in *Pepita*, but less angulated. Hind wings quite pale, silky, white, unlike *Pepita*. Beneath pale, without markings. Head and thorax like forewings. *Expanse* 35 mil. One fresh specimen.

CHARICLEA PERNANA. n. s.

Eyes naked. Front roundly projected. The surface of the clypeus shows a circular rim, enclosing a perpendicular protuberance. The legs are slender and appear unarmed, but of the front tibiae I have not been able to observe the structure. Colors and pattern of ornamentation of the European *Delphinii*, but one-third of the size; the terminal space on primaries, outside of the t. p. line, being olivaceous. Fore wings vinous purple to t. p. line, which is irregular, preceded by a fine line and oblique vinous shading. Inner line angulate, accompanied by vinous shades. S. t. line vague, clouded, deeper marked before the margin, brownish olive. Fringes very pale olivaceous ochrey, as is the wing behind the t. p. line. Hind wings pale fuscous, without marks. Body pale; front with some vinous scales. *Expanse*, 20 mil.

GROTELLA SEXSERIATA. n. s.

Of the same shining white as *7-punctata*, but a little slighter and longer-winged, the primaries crossed by two very distinct black, irregular lines (in place of the usual median lines), while the subterminal line is represented by a series of black spots. All this vividly contrasts against the satiny surface of the primaries which show no other marks. Hind wings pale yellowish-fuscous. Body parts yellowish. Front with a circular projection. Clypeus full. Beneath the wings are shaded with fuscous; fringes and edges yellowish; secondaries inferiorly yellowish. Anal hairs yellowish; body dull whitish. Eyes naked. *Expanse* 26 mil.

The insects of this group are undoubtedly Noctuidae. The fore tibiae are furnished with a claw and a terminal spinule. They have the aspect of Lithosians from their colors. The tarsi are feebly armed, not unarmed as given by Dr. Harvey.

PYROPHILA GLABELLA. *Morrison.*

This species we have from Illinois, California and now from Arizona. It enjoys a wide range and seems to vary but little. The specimen from Tucson is very dark, with the pale terminal space of primaries violently contrasting.

TARACHE BINOCULA. var. VIRGINALIS. *Grote.*

A specimen very nearly like my type from Texas. In this form, the mesial olivaceous-ocher median shade line is perpendicular. The subterminal violet blackish shading of the type is entirely absent from the white primaries of the variety. *Is* it a variety?

LYGRANTHŒCIA BALBA. n. s.

Fore wings faded ochrey, shaded with fuscous within the curved basal line. A dark reniform spot, near the outer line. The lines somewhat incomplete. The outer line is broken into dark spots below median vein. The subterminal space darker, constricted by the very pale tint of the terminal space opposite the disc. Hind wings blackish over whitish; the interlined fringes whitish at base. Body pale ochrey. Beneath very pale ochrey; on fore wings the blackish stigmata, the outer line, and dark s. t. space rather well marked. On fore wings above, the marginal line is broken into dots. This form appears to belong to the *Separata* group. *Expanse*, 25 mil. A number of specimens examined. An inconspicuous fady species, with the darker shades of the primaries giving them a soiled appearance.

In *Lygranthœcia Marginata*, the type of the genus, the eyes are naked. The fore tibiæ have, on the outside, four stout blunt spines in a decreasing series towards the base of the joint. On the inside there is first a long spine opposite to the longest of the outside series, at the extremity of the joint; these two spines embrace the base of the tarsi. There is then a second long spine on the inside of the tibiæ, followed by a very short one. All the tibiæ are armed. With this, the new form *L. Balba*, disagrees by the slenderness of the two inside spinules on the front tibiæ, and the presence of but three spines on the outside. The genera of the Heliothid group need revision, as the species are numerous. For the present I keep the genera already established, and refer the species with ornamentation after the pattern of *Lygranthœcia*, to that genus, until the armature and genitalia of each species can be studied and compared.

LYGRANTHŒCIA COERCITA, n. s.

In my collection is a species from Nevada, allied to *Balba* in appearance, but differing by the presence of four blunt spines on the outside of the fore tibiæ. It is very pale and differs from *Separata* by the hind wings being white. Primaries faded ochrey with the lines white. S. t. space narrow, constricted by the broad white s. t. line opposite the cell. Reniform long, discolorous, defined, extended inferiorly; orbicular, marked. Terminal line dotted. T. p. line not so much exserted, opposite the disc, as usual. Head and thorax nearly white. Same size with its allies. This form is perhaps nearest to *Separata*, but the ground color is as pale as *Regia*, in which the subterminal space is not constricted opposite the disc, and the fine rosy purple color is very different from the faded ochrey shading on the primaries of *Coercita*.

With regard to the moths, very incompletely described by Mr. Stecker under "*Heliothis*," but not figured, I have been able to find out eight species. They belong, evidently, to different genera, and not a few of them are synonyms. *Heliothis imperspicua* of Mr. Strecker is SCHINIA GRACILENTA of Hubner; *H.*

Spectanda, Str., is ASPILA RHEXIÆ of Abbot and Smith. Other species may be referred to *Lygranthœcia*, as they are allied to or identical with species referred by me to that genus. *H. Rubiginosa* of Stecker is LYGRANTHŒCIA SATURATA Grote. This species has the same pearly look as *Marginata*, but the insect is evenly saturated with an orange or ochreous red tint which is peculiar. It is described Bull. B. S. N. S. 2, 74. *H. Ultima* of Mr.Strecker is a *Lygranthœcia* and belonging in appearance near to *Marginata*, *Thoreaui*, and *Saturata*. I have had this species formerly, but did not recognize it as distinct from *Saturata*, which varies in the wings becoming more fuscous, and the brighter saturating color less pronounced. The lines are crenulated as in *Thoreaui*, in both these species. *Ultima* shows a lunule and has a yellowish base and broad dark border to hind wings. *Saturata* has the hind wings with a more or less darker terminal shade, but they are more concolorous. In a specimen before me they are somewhat pale, nearly unicolorous; beneath the markings almost obliterate and, as I described them, "whitish, thickly powdered with orange red." Mr. Stecker has also described LYGRANTHŒCIA MESKEANA, under the name *Fastidiosa*, among his new species of "*Heliothis*." Mr. Neumoegen has kindly allowed me to see another of Mr. Strecker's species of "*Heliothis*." This is *Inclara*, which is an apparently valid form resembling *Atrites*, and belonging to the group of *Tuberculum*. Finally Mr. Strecker's *Regia* is a handsome, previously undescribed, form, different in color, but, apparently, related to *Coercita* and the pale forms, viz., *Separata*, *Acutilinea*, and, perhaps, *Walsinghamii*. I have also referred *Heliothis Sulmala* of Strecker as a synonym to EULEUCYPTERA CUMATILIS. Thus, of eight species described by Mr. Strecker, I would refer none to *Heliothis* proper, while five are synonyms. It is certain that Mr. Strecker's work in the Noctuidæ is of such a nature that its publication must be always a matter of regret from a scientific point of view. From his want of information as to structure, he gives no characters that can be used to eke out his descriptions, while in the moths, which are usually difficult to describe, such data are often of more value for identification of species than color and markings.

Mr. Strecker's work is, on the whole, of such an indifferent character that I am unwilling to criticize it. He has made proportionately more and more unexcusable synonyms than any other writer, and his slovenly descriptions and confessed unacquaintance with structure place him on a level with the worst amateur who has "coined" a "species." In vulgarity and misrepresentation he is, fortunately, without a rival. No amount of "industry" or "facility with the pencil" can condone his conduct.

The translation of Nature into human speech and thought has a history of its own, involving all springs of human action. We should be interested in purifying its ethics and showing a high and simple behaviour in the recognition and publication of the class of facts with which we deal.

HELIOTHIS INTERJACENS.

This form, described by me in the Bulletin of the Brooklyn Ent. Soc. 3, p. 30, is only the Western form of *Phlogophagus*, as I am satisfied from an inspection of more, and a re-examination of old, material. The type is ochreous, almost without markings, and looks like some specimens of *Armiger*, but the angulated median shade is decisive. Others are more marked until we have a form like the typical *Phlogophagus*, but still with a faded ochrey ground color. A specimen from Havilah nearly loses this distinction. It is possible that *Luteitinctus*, with yellow hind wings, is a form of *Phlogophagus;* equivalent to the European *Maritima*, which is considered by some to be a form of *Dipsaci*, the species which, in Europe, represents *Phlogophagus*.

SPRAGUEIA FUNERALIS. n. s.

This is a distinct species, allied to *Pardalis*. The fore wings plumbeous black, glistening, as are the concolorous fringes. A large pale yellow costal spot, outside the t. p. line. The wing is crossed by two pale yellow median bands, the outer widening at costa. The outer band is edged with ochrey inwardly inferiorly, and includes a costal dark speckle in the wide portion of the band, which is only a large costal blotch into which the band merges. Inner band edged outwardly with orange or ochrey. Thorax cupreous. Hind wings blackish with blackish fringes. Size of *Pardalis*, differing by the deeper yellow and larger costal blotches, also by the unicolorous black fringes. A number of specimens in Mr. Neumoegen's collection. This species is remarkable for the lustre of the plumbeous black wings.

CATOCALA COMMUNIS. *Grote.*

The figure of Abbot of *Neogama* has the secondaries bright yellow, but the black band is constricted above the middle as in our Northern form, *Communis*. Our specimens vary in the darker or paler primaries, but the paler form, with the subterminal space decidedly brown, is the typical *Communis*. The reniform and the sub basal space are also shaded with ochrey brown. The abdomen, like the hind wings, is more yellow in the Southern specimens of *Neogama*, which is, like *Communis*, a comparatively more robust species with shorter wings than *Subnata*. Whether this Southern form, the true *Neogama*, which has less brown on primaries, be distinct from our Northern form, which is Guenée's *Neogama*, I know not. But in no event can *Communis* be cited as a simple synonym, especially in these days when the varieties are all being named. It is extraordinary that in Mr. Hulst's paper my species are generally called "varieties," and my varieties, "sub-varieties," or even degraded to simple synonyms. In all this there is no question of advancing science, because in those cases where Mr. Hulst is confessedly ignorant of the form described by me, I am never given the benefit of the doubt. I understand, though I have seen nothing in print, that Mr. Hulst has had "light" in some of these cases. What will be always amazing is the courage which enabled Mr. Hulst to write as he did while he was so much in the dark.

CATOCALA CHELIDONIA. n. s.

♂ ♀. This species is allied to *Formula* by the straightness of the t. p. lines on the fore wings. It differs by the course of the lines in detail, by the large size and different color of the primaries. Fore wings even dark fuscuous gray, somewhat hoary, the lines not very distinct. Reniform shaded with gray; subreniform independent, stained with brown. The sub-costal teeth of the t. p. line more prominent than in *Formula*. The line is regularly waved and runs nearly straight to internal margin below the two prominent discal teeth. Hind wings dark yellow. Exterior band interrupted. Median band rather narrow, swollen on disc, angulated opposite the interruption of marginal band, not reaching internal margin. Some dusky hairs at base. Beneath, with wide blackish borders, the centre of wings dark yellow; band of hind wings repeated. Numerous specimens of this very distinct form in the collection before me. *Expanse*, ♀ 45, ♂ 47 mil.

CATOCALA SIMILIS. *Wm. H. Edwards.*

I have originally referred this as a variety of *Gracilis*, on the strength of specimens, named by Mr. Edwards, in his own and in Mrs. Bridgham's collection. But I have seen since a specimen of *Formula*, labelled by Mr. Edwards as *Similis*, in Mr. Saunders' collection. I am now confident, from a quite recent re-examination of the original description, that it fits *Formula* better than any form of *Gracilis*. It may be that Mr. Edwards has confounded the species subsequently, if not at the time of description. But, in any event, I restore to *Similis* its undoubted right. The species must be known as *Similis*, with *Formula* as a synonym. I have identified now all the species described by Mr. Edwards in Proc. Ent. Soc., Phil., 2,508. They are all valid except *Parvula*, which is a suffused form of *Minuta*. *Gracilis* also has a suffused variety, both in the typical form and in the very distinct darker and hoary variety which I have called *Sordida*. My identifications of the Eastern species of *Catocala*, including *Grynea*, have been generally accepted; and, with all the new species recently described, those described by Guenee, which I could not make out, in 1872, remain still unidentified.

The publication of a paper on the species of *Catocala*, by a clergyman, the Rev. Mr. Geo. D. Hulst, in the Bulletin of the Brooklyn Entomological Society, obliges me to notice its contents briefly. The criticism that I make on this paper is, that its publication was entirely unnecessary from a scientific point of view. This may be substantiated by the fact that every change in that paper from my "List," or my original "Revision," Tr. Am. Ent. Soc. 4, 1872, can be shown to be superfluous or erroneous, and often made without a knowledge of the species discussed. Neither from the literary or biological point of view did the author possess sufficient information to warrant his writing extendedly upon the subject.

In a somewhat lengthy preamble, in which I find nothing original which is at the same time important, Mr. Hulst likens the present knowledge of the species of *Catocala* to a diseased infancy. In this Mr. Hulst confounds the state of his own mind on the subject with that of others, an error often committed and difficult to guard against. In the course of his remarks, Mr. Hulst notices the fact, alluded to by other writers, that certain species of *Catocala* approach each other, while separable by the color of the hind wings. Mr. Hulst cites the example of *Illecta* and *Concumbens*, originally given by myself. But he adds to them the species *Zoe* and *Ilia*, as affording a parallel case. Now these last two do not differ by the color of the secondaries, except so slightly as not to warrant the remark, and agree so closely in other respects, that it is perhaps doubtful if they are distinct species. The orange and yellow species cannot be separated under distinct groups, as these colors are not always constant in one species. I may cite *Verrilliana*, which varies from the type, in which the hind wings are brick or orange red, to var. *Ophelia*, where they are purely red or crimson and to a variety from Arizona where they are yellowish. Again Mr. Hulst cites *Cerogama* and *Relicta*, but these two are not at all nearly allied. *Relicta* belongs to the sub-genus *Catocala*, as restricted by Hubner, and I have originally shown, in the pages of the *Popular Science Monthly*, that our form has a few blue scales on the white band, and thus light is thrown on the probable common origin of our form and the European *Fraxini*.

I will now substantiate my remarks by going over the points made by Mr. Hulst, in which he differs from my List. In all of these he agrees with Mr. Strecker, and thus I am led to ascribe Mr. Hulst's venture solely to a desire to forestall opinion in favor of Mr. Strecker. It is known that one of Mr. Strecker's numbers was ante-dated "August," while not issued until November. The reason for this offense was that Mr. Strecker therein re-named certain of my species published by the American Entomological Society in September. In this way Mr. Strecker hoped to secure the recognition of his names. But it is not the only attempt of Mr. Strecker to secure for himself priority. Another writer has convicted him of similar work in the Butterflies, see Can. Entom. p. 76, 1878, where Mr. Strecker's methods "can scarcely be called honest."

The statement made by Mr. Hulst, that he "attempted to get at the truth" of the matter, is very singular, seeing that he only consulted Mr. Strecker and took his version without letting me know anything about it, or investigating the facts I could have furnished. One of the first things to be done, if it was intended to get fairly at the facts, was to procure the statements of the principals. But Mr. Hulst, though he had sent me some specimens to determine at that very time, never informed me that, in his forthcoming paper, he was to announce himself as "compelled to judge" between Mr. Strecker and myself. It is of a piece with Mr. Hulst's descriptional work, that he dislikes to consult the necessary authorities. This "judge" gives a wonderful series of "reasons" for condemning me unheard, but the whole have the air of an arrangement between Mr. Strecker and the "judge," which detracts from the solemnity and impartiality of the proceedings. As a specimen of these reasons under which my three species are to be overthrown to rise again under Mr. Strecker's sponsorship, I will repeat one or two of Mr. Hulst's statements. Mr. Hulst prefers, for instance, the name *Amestris*, to *Anna*, on the ground, "that" one is "strictly Catocaline (?), while" the other is "not." It appears from this that "Catocaline" is a new euphemism for loose behavior, and that the Rev. Mr. Hulst approves of the names of Swinburne's heroines being applied to a group of moths whose conduct is no worse, so far as I have observed, than their neighbors. To prefer the "strange woman" to a prophetess, is singular taste in a clergyman. And then Mr. Hulst clearly states that "Mr. Strecker's names were given prior to those of Mr. Grote," and in the next sentence qualifies it singularly and suddenly by the words: "Presumably so;" and then proceeds with his special pleading. "On the face of it," Mr. Hulst says, that Mr. Strecker is earlier. The "face of it" reads "August," but it ought to read "November." As I do not claim any earlier date than "September," why is all this argument given to support Mr. Strecker? The "gentlemen" who saw Mr. Strecker's "proof sheets in August," have, I am told, either disappeared or altered their minds. If Mr. Strecker did not date his number "August" in order to deprive me of priority, what did he do it for? Mr. Hulst says Mr. Strecker's claim has "every evidence of truthfulness." Well, it can be positively proven that the matter which Mr. Strecker dates "August" could not have gone into the printers hands before "October." For Mr. Hulst's sake Mr. Strecker ought to come forward and deny this and prove his date of "August."

It will be seen from the above that Mr. Hulst's "reasons" are to far fetched to be accepted, and that he is not a fit "judge" in the matter. I cannot, perhaps, successfully appeal from his decision, prejudiced, to Mr. Hulst unprejudiced, but I have collected what outside evidence I can now find and given it to Mr. Hy. Edwards, who, from his own particular knowledge, is better fitted to settle the matter fairly than anyone else to whom it is of any importance. In coming to an opinion in the matter, Mr. Hy. Edwards will at least possess the advantage of knowing all that can be said on both sides.

The more difficult work in the genus was the identification in our Collections of the species described by the older writers, and then by Gueneé and Walker. This was brought together in 1868 to 1872, when the collection of the American Entomological Society was determined by myself. None of my determinations have been since changed, notwithstanding the amount of wisdom rapidly developed by Mr. Strecker after the publication of my paper and the opportunity of examining that collection presented itself. Yet two species recognized by me at different times, the *Illecta* and *Nuptialis* of Walker, were re-named by him. At this day, when the original French and English descriptions are not taken in hand, and the difficulties of the earlier students are surmounted by the adoption of their determinations, little thought is given to the labor that was necessary in order to afford a safe basis on which new species could be recognized and described. In the present case the labor was not done by Mr. Strecker, although from the way in which Mr. Hulst speaks of him one would infer that he had performed a great deal of hard work in the genus, in every way. He simply had to pick out from the fresh collections then coming in from all parts of the country, the new species not represented in the Philadelphia collections, and he commenced by suppressing a MSS. name of mine for his *Obscura*, a name which, I am afraid, is not *Catocaline* enough for Mr. Hulst's ear. But, although Mr. Strecker has furnished some hastily drawn and colored plates, he has not advanced the knowledge of the genus beyond the new species. He has not cleared up any of the doubtful points as to synonomy, but has added plenty of his own. He was not able to separate the sexes of *Relicta*, and, after indulging in many remarks as to the insufficiency of descriptions without figures, he described several species with less detail than any other author, and gave no figures of them. Yet such has always been the success of illustrations, that his have stood in the stead of serious work, and have conferred upon Mr. Strecker a reputation which cannot remain when the facts are seriously considered and weighed. The reputation that will undoubtedly permanently appear as the result of that action of Time which Mr. Strecker is so fond of anticipating, can hardly be of a desirable nature, unless the standards of good conduct and good taste, to say nothing of good scientific work, change decidedly from what they are at present.

But to return to Mr. Hulst's paper and his course with the described species of *Catocala*.

I feel sure that *Alabamæ*, from Alabama and Florida, is quite distinct from *Grynea*, to which Mr. Hulst unites it, without even knowing the species. The idea that *Præclara* is a form of *Grynea* because the specimens "bear in number a certain regular percentage to specimens taken of *Grynea*," is unique as a reason for their identity. The notion that *Abreviatella* and *Whitneyi* are varieties of *Nuptialis*, I must totally dissent from. *Cælebs* is united with *Badia*, because Mr. Strecker has expressed the opinion. But it has since transpired that Mr. Strecker did not know *Cælebs*. He pronounced specimens of it, which were sent to Mr. Hy. Edwards by Mr. Allen, from Maine, to belong to a "new species." Of course, Mr. Hulst follows suit.

Flavidalis is not a synonym, but a well-marked variety of *Innubens*. The hind wings are yellow. A rumor has been circulated that my types were baked specimens, and that the color was changed in this way. It is not so. They came from different localities, are, moreover, perfectly fresh, and Dr. Bailey, who has critically examined them, is of this opinion. After the primaries, the hind wings above are found most subject to variation. *Communis* is not a synonym of *Neogama* of Abbot & Smith, as which Mr. Hulst refers it, without remark. Southern specimens agree with Abbot's figure in the hind wings being light yellow; in the Northern form, *Communis*, they are dusky buff yellow. *Meskei* is quite different from *Uniguga*; that they are the same is one of Mr. Strecker's ideas. I believe that Mr. Hy. Edwards has published his opinion that they are readily distinguishable and are probably different species; I feel certain that they are. *Residua* is more distinct from *Insolabilis* than any two black species in the same sub-group. There is no shadow of reason to consider them the same, and I have heard that the larvæ are now known, and found to be quite different. *Arizonæ* is cited as a synonym of *Walshii*, but the latter is not found in Arizona, and the two are, at least in my opinion, different; as before stated (compare desc.), I believe *Aspasia* is a redescription of *Arizonæ*.

My type of *Arizonæ* went to Philadelphia, and, I believe, was in Strecker's hands after "*Aspasia*" was described by him. Compare his brief description of the latter; both he and I compare the new form with *Amatrix*. I certainly knew *Walshii*. *Beaniana* is not at all related to *Briseis*, nor is *Semirelicta*. The latter is near Mr. Hulst's *Pura*. It was a happy stroke and worthy of the disciple of Mr. Strecker to refer *Semirelicta* as a var. of *Uniguga*, and remove *Pura* to some distance as a distinct species. Our author could not have studied the literature of his subject, from his uniting *Cratægi* and *Polygama*, with Mr. Saunders' description of the distinct larva of *Cratægi* on record. If this paper was known it ought to have been alluded to. The imagos of *Polygama*, *Pretiosa*, *Cratægi* and *Mira*, are quite easily separable. *Mira* has been collected in large numbers by Professor Snow; it is, beyond question, a separate form, not being as near any of the three as they are to each other. It is improbable that Mr. Hulst knew these. While good species are thus referred as synonyms or varieties from no reason that can be called scientific, undoubted varieties are called distinct species by Mr. Hulst, who thus catalogues *Gisella*; and as to *Herodias*, he does not note that it may be a form of *Ultronia*. In conclusion, it is difficult to speak seriously of the paper; it turns the very sequence of the species upside down, and it is to be hoped that it will be forgotten for the sake of the science which it has in no way advanced.

It will at once appear that my remarks as to the absence of anything really new and valuable in Mr. Hulst's paper are warranted, when I state that not one of the synonymical difficulties in the genus left unsolved by me in the "Revision" are cleared up. Mr. Hulst knows only the species I there identify, and certain subsequently described ones. Guenee's species, unidentified by me, are equal mysteries to him. It is improbable that Guenee has even been consulted by Mr. Hulst. Certainly my collection was not examined. It is clear that there must have been some other than a scientific reason for the appearance of Mr. Hulst's paper; but, whether I am right or wrong in this belief, the fact is not altered that there is nothing in the paper, outside of the championship of Mr. Strecker's views, that excused its writing, and certainly nothing that justified its publication.

The species of *Catocala*, which I have described, and which in most cases renewed examination or fresh material convinces me I have been correct in considering as distinct, are as follows:

Retecta, *Robinsonii*, *Flebilis*, *Levettei*, *Residua*, *Angusii*, *Arizonæ*, *Coccinata*, *Meskei*, *Semirelicta*, *Verrilliana*, *Snowiana* (?), *Adoptiva*, *Communis* (?), *Subnata*, *Piatrix*, *Habilis*, *Coelebs*, *Badia*, *Anna*, *Clintonii*, *Abbreviatella*, *Frederici*, *Mira*, *Alabamae*, *Praeclara*, *Dulciola*, *Fratercula*, *Chelidonia*—29 species.

The varieties, which are all sufficiently pronounced as to be worthy of a name, are as follows:

Simulatilis, *Flavidalis*, *Scintillans*, *Phalanga*, *Sinuosa*, *Bunkeri*, *Basalis*, *Westcottii*, *Sordida*, *Lineella*—10 varieties.

It is possible that *Snowiana* may be a variety of *Neogama*, but the type differs from any Kansas *Neogama* yet seen.

The synonyms which I have myself discovered in the course of my studies and announced are as follows:

PONDEROSA, FORMULA.

Were we to follow the examples of Guenee and other European authors of note, these names would still obtain as replacing others preoccupied in the family.

With regard to the species re-described by Mr. Strecker under the date of "August," whereas the publication was not received until November 12, I have shown that Mr. Strecker placed a false date, and have exposed his motive for doing so. Mr. Strecker publishes his own descriptions, whereas I had nothing to do with the printing of mine, which was done in a distant city by a scientific society. My "extras" were in the hands of correspondents some time before Mr. Strecker's number appeared. The date my article bears is the date given by the society, and for which it is responsible. It rests with Mr. Strecker and his friends to attack the American Entomological Society to disturb its dates. As a matter of fact, my paper was printed first, but it is enough for me that the society's signatures give the date before that on which Mr. Strecker's number was issued. The American Entomological Society will be able to defend its method of printing its Proceedings, which is intended to protect students who place their papers in its hands from just such attempts as Mr. Strecker's. But I have shown the justice of my case as far as it is possible for me to do when I prove the real date of Mr. Strecker's irresponsible publication. If a scientific society then shows by its signatures that my paper is printed before the corrected date of issue of my contestant, there can be no doubt that my names have priority, and Mr. Strecker's attempt to deprive them unlawfully of their advantage should meet with the fate it deserves.

I am spared much by Mr. Strecker's own admission in a later number, under "Notes," that my paper is dated September. This statement is accompanied by one of his own, that his publication of the species was "printed August." This is absolutely false, and if Mr. Strecker will challenge the statement the proof is ready for him. The man who openly advertises that he "covets" specimens may not be sensitive to shame.

HOMOPYRALIS REPENTIS. n. s.

♂. This species looks like a small *Homoptera*, but the palpi are projected and pointed. It is about the size of *Discalis*, but the four wings are of a paler brown, with less of the dark suffusions and shadings of either *Discalis* or *Tactus*. This latter is the type of the genus, and appears to have a wide distribution along the Atlantic coast. Mr. H. B. Moeschler records it from Guiana, and says also that he has received it from the West Indies. The new species, *Repentis*, has the lines fine, black, cleanly marked. The outer or transverse posterior line, commences at apical third, and forms two undulations opposite the cell, running in very strongly at the middle of the wing, to below a black, moderate, upright, solid, discal mark, the reniform spot. Thence it runs unevenly, near the median shade, to internal margin. The median shade is diffuse. The inner line is uneven, black, not arcuate, with a superior inward sinus. The base of the wing and the subterminal space are a little darker than the rest. The sub-terminal line is indistinct, threadlike, uneven, and is inaugurated at costa by a thicker black streak, which contrasts very strongly and appears to run at variance with the course of the line itself. The fringes are alternately darker and paler brown. The secondaries are more dusky brown. There is an angulate inner black line, not reaching the costal margin, and followed by a finer line. Then there is a thick, black, extra-mesial line also expiring much before the costal edge. There is a fine denticulate sub-terminal line edged with pale or whitish and followed by a reddish shade. A black, terminal, continuous line before the fringes. The body is light brown, with a dusky edge to the collar. Beneath the markings are effaced, the lines feebly marked.

There are now four species of this genus from our territory, described by myself. *Tactus* and *Discalis* I have collected in New York State. The latter is larger than *Tactus* and has a reddish discal stain on secondaries. *Repentis*, the new species, is from Arizona, and *Tantillus*, the smallest and darkest form, has been collected in Texas by Mr. Belfrage.

The genus is evidently lower than Homoptera, and prepares us for the Deltoids. The further south we go, the more do we find the forms increase in abundance which belong to the *Fasciatæ*. Their resemblance to the *Geometridæ*, is shown by the similarity in the ornamentation of the upper surfaces of the wings. In the typical *Noctuidæ*, the secondaries are unbanded, as a rule, and their upper surfaces resemble the under surface of the primaries, in their want of markings and more faded tone. In my arrangement of the genera of the *Fasciatæ*, I have been guided by the tendency towards a similarity of marking on the upper surface of the wings, and also in the shape of the primaries. These become more unlike the typical *Noctuidæ*, and, in their different proportion and sharpness of apices, also affect the *Geometridæ*. The Deltoids in their neuration are *Noctuidæ*, in the ornamentation and length of palpi, frequently also in their glistening surfaces, they are like the *Pyralidæ*. That they are an aberrant group seems to follow from the diversity of structure which they show. The feet have an unusual structure in some genera, in others the antennæ. Some of the lower genera of the *Fasciatæ* (e. g. *Sylectra*) resemble them in this. *Mirandalis* has very curious antennæ. I recorded the fact that I took a specimen of this curious moth at the Battery, in this city, about twenty years ago. It may have been brought in a vessel. The migration of the moths up the Atlantic coast has not been sufficiently studied. As a rule, there is a seasonal migration from the south, northwardly.

MEGACHYTA SUBFLAVIDALIS. n. s.

♀. Resembles *Lituralis*, in the presence of the two black costal spots which inaugurate the median lines, but the inner line is outwardly oblique and even. The lines themselves, below the large costal spots, are faint, ochrey. The wings are pale gray, shaded with ochrey terminally. The outer line is thick, sinuate. Reniform an upright ringlet. S. t. line dotted, undulate. Secondaries stained with ochrey, the inner line wanting. S. t. line denticulate. A terminal dotted line on both wings; fringes concolorous. Beneath stained with yellowish. Discal marks and the sub-terminal and terminal lines indicated. Head and thorax gray. *Expanse* 25 mil.

Much paler and more simply marked than *M. Lituralis*.

CYMATOPHORA (BOARMIA) PULMONARIA. n. s.

♀. Very large and dark, related to *Umbrosaria*. Dark, blue gray, a wide, blackish, angulated shade within the inner black median line and following its shape. Median shade narrow, scalloped inferiorly, diffusely marked on costa. Outer median line followed by a diffuse, irregular black shade. Sub-terminal line whitish, contrasting. A reddish longitudinal shade from base to s. t. line, above internal margin. Secondaries with discal dot and the lines and shades of forewings continuously repeated; external margin slightly uneven. A faint, black, interrupted, festooned terminal line and fringes pale gray on both wings. Beneath, pale whitish gray, immaculate, strangely contrasting. Body above dark gray, below, pale. *Expanse* 42 mil.

The generic location of this fine species will be uncertain till we know the male.

PHASIANE COLATA. n. s.

Size of *Snoviata*. Gray with transverse strigæ. The primaries have three transverse brown lines, marked on costa, the basal one continuous, but the others faintly marked; but the whole wing is covered with fine hair lines, more or less continuous. Before the white sub-terminal line the wing is stained with ochreous. The terminal space is very much darker than the rest of the wing. Two apical costal dots. The gray fringes have a white basal line on both wings. A dotted black terminal line on primaries. Beneath gray, the hind wings mottled. Primaries with an ochrey shading. Secondaries gray, without prominent markings. Body gray.

PHASIANE HYPAETHRATA. n. s.

♀. Thorax, base of primaries and terminal space, outside of t. p. line, blackish brown. Median space clear, light, buff yellow, including a discal dot, and the costal margin with some dark speckles. Apices shaded with fulvous. Interior line black, arcuate. Outer median line angulate opposite the cell. Subterminal line feebly indicated by some white scales. Secondaries light brownish, irrorate. A faint mesial line and discal dot. Abdomen light brown. Beneath light brownish, reflecting the marks of upper surface, irrorate and strigose; the discal dots repeated. *Expanse* 27 mil.

Very different from the described species. It curiously resembles the extreme variety of *Zanclognatha laevigata*, described by me, on account of the yellowish contrasting median field of the forewings.

BOTIS CROCOTALIS. n. s.

This species is entirely of an orange brown, concolorous, body and both pair of wings. The body beneath and base of palpi pure white. It is immaculate and of the size of *Ventralis*, but it is nearer to the group of *Fodinalis*. Several specimens have been seen by me.

EURYCREON ELAUTALIS. n. s.

♂ ♀. This species has the clypeus prominent, embossed; the infra-clypeal plate exserted. The pattern is not unlike *Rantalis*, but the hind wings are more transparent and the bands on fore-wings angulated. Fore wings pale ochrey yellow. Anterior line outwardly oblique, uneven, shaded before with fuscous. Reniform indicated. Outer line uneven, angulated opposite the cell, followed by a fuscous shading over sub-terminal space. The s. t. line indicated and with a deep sub-median sinus. No terminal line. Fringes whitish. Hind wings white, with a denticulate extra mesial line, outside of which the wing is washed with ochrey. Fringes white. Head and thorax ochrey. Beneath paler, the markings faintly refletced. *Expanse* 22 mil.

I have examined a number of examples, some less distinctly marked than others.

NOTES ON SOME NORTH AMERICAN LEPIDOPTERA

BY A. G. BUTLER.

(*Concluded from page* 132.)

In the present part of my paper I offer a few remarks on the Noctuites forwarded to us by Mr. Edwards.

With the Noctuites of North America I have hitherto had very little to do; but I wish to take advantage of the present opportunity to call the attention of Lepidopterists in the New World to the true affinities of this tribe of Moths.

A study of the ontogenetic development of the Noctuites shows that they are in all probability descended from the Geometrites; that their ancesters were "loopers." It is therefore very important in a classification of the genera of Noctuites to place those genera in which the looper-like character is retained longest (*i. e.*, the typical semi-loopers) next to the Geometrites, and those in which it is soonest lost at the opposite end of the series. I cannot myself attempt to do this with the few species here enumerated, more especially as I could only guess by analogy what the larvæ of some of them would be like, but there can be no question that a study of the earliest larval stages (suggested by Weissmann) will throw a flood of light upon the true affinities of this somewhat perplexing group.

It should also be borne in mind by breeders of Leipdoptera that the adult larvæ of the so-called *Bombycoidæ* exhibit the characters of *Liparidæ*, *Arctiidæ* and *Notodontidæ* as well as those of typical Noctuites (and that on that account I have distributed several of the genera among these families), yet an examination of the earliest stages would alone satisfactorily decide whether the species and genera associated under this family are in reality allied to the Bombyces or not; they have probably been placed in this tribe on account of their well-developed proboscis (though many of the *Arctiidæ* are almost equally well furnished in this respect, and though the stress laid on this character, if applied to the *Sphingidæ*, ought to separate the *Acherontiinæ* from that family); as to their somewhat vague resemblance in the imago state to *Xylinidæ* and one or two other families of *Noctuæ* that is in my opinion quite unimportant.

Lastly, it is worthy of consideration whether the smooth larvæ of the true Noctuites ought to be widely separated from the similarly smooth larvæ of the *Sphingidæ*, and separated moreover by the interposition of a vast assemblage of hairy coccoon—forming, woolly looking moths like the *Arctiidæ*, *Liparidæ*, *Lasiocampidæ*, *Saturniidæ*, *Limacodidæ*; although the last two families in their smoother, though eccentrically formed larvæ, are apparently nearer to the Noctuites than the others.

Considering the almost hopeless chaos in which the classification of the Hetercerous Lepidoptera has lain up to the present time, it seems to me to be most important that all these points should be well ventilated and definite conclusions arrived at.

Respecting the genus to which the first two species are referred, I personally have some doubts, they are so extremely like the *Apamea connexa* and *A. unanimis* of Europe in pattern and general coloration, that had I received them unnamed I should unhesitatingly have referred them to that genus; nevertheless the study which Mr. Grote has devoted to the types of the obscurer genera in this tribe makes me cautious of offering any decided opinion until I have had time and opportunity to examine the matter thoroughly, as he has done.

APAMIDÆ.

MAMESTRA CINNABARINA. *Grote.*

Washington Territory.

MAMESTRA CUNEATA. *Grote.*

California.

NOCTUIDÆ.

AGROTIS REPENTIS. G. and R.

This species appears to belong to the same section of the genus as *A. Impacta* of Venezuela.

AGROTIS HAVILAE. *Grote.*

I should have placed this species next to *Spælotis Ravida* of Europe which it much resembles.

ORTHOSIIDÆ.

ORTHOSIA CRISPA. *Harvey.*

This is almost intermediate between *O. lævis* of Europe and *O. lizetta* of Japan; it is rather larger than either.

HADENIDÆ.

HADENA INDIRECTA. *Grote.*

Seems to belong to the *H. convergens* group, and to be allied to the "*Xylophasia*" *mucens* of Walker's List.

HELIOTHIDÆ.

MELICLEPTRIA OREGONICA. *H. Edwards.*

Summit of the Sierra Nevada.

We have nothing closely resembling this species in the Museum.

MELICLEPTRIA DIMINUTIVA. *Grote.*

Knight's Valley, California.

This little species has a singular resemblance to the Pyralidian *Noctuomorpha normalis* of Europe.

XANTHOTHRIX RANUNCULI. *H. Edwards.*

Havilah, California.

This species belongs to a genus which is quite new to me; two very distinct forms (which I should have supposed to be specifically separable) were sent by Mr. Edwards.

PHALÆNOIDÆ.

It appears to me that the genus Annaphila would be more appropriate here than in the *Anartidæ.* A comparison of the two species hereafter noted with *Anarta*, shows that the secondaries are conspicuously broader than in that genus whilst the coloration is similar to that of *Archiearis.**

ANNAPHILA DEPICTA. *Grote.*

Sonoma County.

ANNAPHILA DECIA. *Grote.*

Havilah.

PLUSIIDÆ.

PLUSIA CALIFORNICA. *Speyer.*

Kern Co., and Havilah, California.

I found two examples of this species in the Museum collection from Vancouvers' Island, under *P. gamma.*

PLUSIA BRASSICÆ. *Riley.*

California.

This agrees in every respect with our examples of the European *P. U. aureum* of Guenée. I cannot regard it as a distinct species.

PLUSIA DYAUS. *Grote.*

Indian River, Florida.

An example of this species from Orilla was amongst our specimens of *P. precationis.* It is extremely close to the widely distributed *P. verticillata*, which should, I think, stand between it and *P. precationis.*

---

* **The genus seems to me related to *Eustrotia* (*Erastria*) A. R. G.**

BOLINIDÆ.

SYNEDA DIVERGENS. *Behr.*

Truckee, California.

The *Euclidia Capiticola*, of Walker, and *E. petricola*, come near to *S. divergens*.

LITOCALA SEXSIGNATA. *Harvey.*

Colorado.

CATOCALA AHOLIBAH.

Vancouvers Island.

This species is also in the British Museum, from the same locality. With it we received what appears to be a very distinct species of the same group.

CATOCALA IRENE. *Behr.*

Mendocino, California.

Allied to *C. Electilis*, of Mexico, but the coloration of the primaries more like that of *C. innubens.*

CATOCALA CALIFORNICA. *W. H. Edwards.*

The nearest species to this, in the Museum, is a larger and undetermined *Catocala* from Texas.

CATOCALA MARIANA. *H. Edwards.*

Seems to come nearer to *C. briseis* than anything else in our collection. The latter was wrongly identified by Walker as the *C. parta*, of Guenée (Lep. Het., p. 1193).

CATOCALA VERRILLIANA. *Grote.*

Humboldt Co., California.

Quite new to me.

EUCLIDIIDÆ.

EUCLIDIA CUSPIDEA. *Guén.*

Knight's Valley and Havilah, California.

Smaller and with more sharply defined markings on secondaries, than in our examples.

A NEW AND REMARKABLE BOMBYCID MOTH FROM ARIZONA.

BY HENRY EDWARDS.

EULEUCOPHÆUS NEUMOEGENI. n. s.

♂. Head white, with a few blackish hairs intermixed, the palpi bright reddish brown. Thorax snow white, with a central black band. Antennæ orange brown. Abdomen with deep claret brown at base, shading towards the anal extremity into orange brown. Beneath it is reddish brown at the base, white on the middle and blackish on the posterior segments. The legs are all reddish brown at their base, the tibiæ snow-white edged with black, and the tarsi jet black. Primaries and secondaries snow-white, the former with the anterior line rather narrow, nearly straight, jet black. Upon it, above the median nervule, rests a pale orange transverse dash, surrounded by black. The discal mark is also pale orange, almost oblong in shape, and surrounded by black band. The posterior line is almost parallel with the margin, slightly sinuate, dentate about the middle, and continued in the same form on the secondaries which are slightly more transparent than the upper wings, bearing also a pale orange discal mark surrounded with black. The under side has the markings of the upper distinctly repeated. In one of the two ♂ examples before me there is a bunch of lemon yellow hairs at base of the primaries beneath, and the same color is continued to the base of the legs and the sides of the lower surface of the margin. This is evidently not the result of discoloration, as the specimens are wonderfully fresh.

♀. Similar to the ♂, but a little larger, and with the four posterior segments of the abdomen, clear white, above and below, the middle segments only being narrowly edged with reddish brown. The stigmeta in ♀, are very strongly marked, jet black.

Exp. wings, ♂. 48 m.m. Length of body, 21 m. m.
Exp. wings, ♀. 62 m.m. Length of body, 27 m. m.
2♂. ♀. Prescott, Arizona. (I. Doll.)
Types. Coll. B. Neumoegen.

I have no hesitation whatever in placing this remarkable insect in Packard's genus, which it seems to connect in some respects with *Hemileuca*, its remarkable coloration being, however, the very reverse of the latter genus. I regard the species as the handsomest Bombyx discovered for many years in the United States, and as such it gives me unusual pleasure to dedicate it to my friend, Mr. B. Neumoegen.

It is to his liberality and boundless enthusiasm in the cause of entomology, that we are indebted for the knowledge, not only of this beautiful insect, but of many other of supreme interest and importance, and the example set by Mr. Neumoegen is in every way worthy of imitation by those who have the power to help the progress of science, not only in this, but in other branches of study. For nearly two years Mr. Neumoegen has kept an earnest and intelligent collector in the field, who has poured into the studios of entomologists unheard of treasures, many of which yet remain to be described. Such devotion to entomology is as honorable as it is rare, and should excite in the minds of all students a feeling of the deepest appreciation.

I hope in some future number to present the readers of "PAPILIO" with a figure of this most charming insect.

A NEW HEMILEUCA FROM SOUTH-EASTERN ARIZONA.

By B. NEUMOEGEN.

HEMILEUCA YAVAPAI. n. sp.

♂ Head and appendages and joints of antennæ dark, rusty brown. Pectinations of antennæ blackish brown. Prothorax white, with an intermixture of black hairs. Thorax of a deep maroon red, overlaid with grayish hair. Patagiæ black, overlaid with long grayish hair. Abdomen very pilose, being, as well as the male tuft, of the brightest rust red color, but having a lateral layer of blackish hair from first to fourth segments.

Beneath the thorax is rusty red and the abdomen deep black, with a sprinkling of short whitish hair on the segments. The heavy pilose covering of the upper part of the abdomen and the anal tuft overlapping the sides, giving it the appearance of a heavy rust red fringe. Legs black, femora heavily furred with rusty red and the tibiæ having a light black and white hairy tuft.

Primaries opaque brownish black, the costa and fringes being concolorous. The space near anterior margin sparsely powdered with white scales, hardly perceptible. A transverse, small discal spot of light yellow, surrounded by a broad black patch or ring. A transverse extra mesial band of grayish white, starting from subcostal vein and resting on submedian vein. The band is of quite irregular shape, being broadest at the space between discal spot and exterior margin, and narrowest at the intersection of median veins. The inner part of this mesial band, between discal spot and base, being obliterated and indicated only by a grayish white crescent line, just sufficient to round off the shape of the black halo surrounding the discal spot. A whitish subcostal line, commencing at base of wing, and terminating within half of the space between base and discal spot. Costa somewhat concave in the middle. All the veins crossing the mesial band appear black.

Secondaries black, opaque, with concolorous fringes. A minimal discal spot of light yellow with darker indications of a surrounding black patch.

Beneath the wings as above, the mesial band of primaries being dirty gray, and the subcostal vein of primaries, as well as the subcostal and discoidal veins of secondaries, being indicated by light yellow lines.

Expands. 1¾–2⅛ inches.

Length of body. ⅝–¾ inch.

♀. Thorax dark brown-red, heavily overtufted with black and white hair. Patagiæ with very heavy black and white tufts. Abdomen black with short grayish white hair on segments and an anal tuft of bright rusty red with an upper layer of gray and white hair.

Primaries as in the ♂, the middle of the costa also somewhat concave, the extra mesial band broader, and the sub-costal white line from base towards the middle of the wing more conspicuous than in ♂. The powdering of whitish scales between discal spot and anterior margin also more pronounced.

Secondaries brownish black with concolorous fringes. An extremely small, light yellow discal dot; its tint being nearly suffused by the darker black of its surrounding halo. An indication of a mesial band from costa to anal angle by irregular, detached, whitish powdered spots, being smallest near apex and anal angle, and largest between first and second median nervules.

Beneath, primaries as above. On secondaries the grayish white blotches of the mesial band more pronounced and larger than on upper surface, taking irregular, triangular shapes between first, and second and third veins.

Expands 2.3-16, 2.7-16 inches.

Length of body, 1, 1.7-8 inch.

This beautiful insect is similar in its form to *H. Juno*, Pack., and *H. Diana*, Pack., but is readily distinguishable from both by the glaring red abdomen of the ♂, and the black abdomen of the ♀. Besides, *H. Yavapai* has a white sub-costal line, and other peculiarities, which do not agree with *H. Juno* (see Annual Rep. Peabody Acad. Sci. for 1871, p. 87; published April, 1872).

H. Yavapai ♀ approaches *H. Diana*, (see Rep. Zoolog. Coll. Lieut.Carpenter, Colo., 1873, U. S. Govt. Print. Off., 1875, p. 557), but is a much larger insect. It has not the conspicuous white band on secondaries, which is the salient feature in *H. Diana*, but is distinguished by the white sub-costal line.

H. Juno, *H. Diana*, *H. Yavapai*, inhabit the same zone, Southern, Southeastern Arizona and Sonora and may have a common pedigree. *H. Yavapai* is the most distinctively marked form. It has been raised by Mr. J. Doll, and of the forty ex l. examples, at present in my possession, not a single one materially deviates from the description herein given.

The habitat of *H. Yavapai* is Sierra Colorado and San Pedro river, Arizona.

Types ♀ ♂. ex l. Coll. B. Neumoegen.

MOTHS COLLECTED BY PROF. SNOW IN NEW MEXICO, WITH LIST OF EUDRIINI.

By A. R. Grote.

The following species have been sent to me by Professor Snow from his captures this year in Northern New Mexico. The species are often the same as the Texan, while some of the forms are like those described from Mexico. The dangers of collecting in that region from the Indians are yet quite considerable. Prof. Snow very narrowly escaped capture by bands of the Apaches.

Halesidota Labecula. n. s.

♂. Abdomen scarlet above, beneath and at the sides yellowish; a stigmatal series of black dots and a dorsal series on the terminal segments. Fore wings transparent, speckled with brown and clay colored scales. Five clay spots on the costa mark the inception of the transverse lines. Subterminal line, double, continued, dentate. Hind wings yellowish, transparent, with narrow brown edging.

Head and thorax pale yellowish brown. Antennæ yellowish brown, strongly bipectinate. Fore coxæ red inwardly. Legs clay colored, marked with brown, the femora stained with red within.

Expanse, 60 mil. One fresh male (869).

Larger and less yellow than *Edwardsii*, differing by the brownish thorax. The terminal abdominal marks when present in *Edwardsii* are more or less diffuse and livid.

Quadrina. n. gen.

The primaries are short and wide. The cell is very short and veins long. Median vein 4-branched, cell open, veins nearly equidistant vein, 4 from base of cell. Vein 10 out of 9, a long furcation. Abdomen untufted. Differs from *Citheronia* by the depressed apices, long, curved nervules and 4-branched median vein of primaries. Veins 6 and 7 thrown off together; 8 arising midway between 7 and 9. Median vein on hind wings also 4-branched; cell open, nervules straight and long; 4 and 5 together; 3 near 4 from lower side of vein. Costal and subcostal veins forming an accessory cell at base. Head rather broad and not as sunken as usual; thorax hardly elevated in front. Squamation and aspect of *Citheronia sepulcralis*. The cell on primaries appears closed at base by the fusion of subcostal and median veins.

Quadrina Diazoma. n. s.

♀. Antennæ pectinate to tips, brownish. The four wings nearly concolorous brownish, brighter at base, where they have longer scales. A curved, even, dark, extra mesial shade line on primaries. An uneven, broken, subterminal line. Hind wings with a reddish shade, which obtains slightly at apices of primaries. Body darker, concolorous.

Expanse, 95 mil.

The neuration of this species seems to me to be indicative of a comparatively low and old type of Bombycidæ. This is seen in the long veinlets, equidistant; the shape of the wing, the costal margin curved, depressed before apices. Without the male, it is difficult to be certain of the true position of this form. The brown color is brighter, more red tinted, brighter ochery brown at base of wings than in *Coloradia Pandora*, and altogether it is removed from that type and in several characters approaches *Citheronia*. Differs from *Gloveria*, by the larger head, broader clypeus and smoother body clothing. There is a gray mixture on the fore wings of *Coloradia* and *Gloveria*, wanting in *Quadrina*, which is a smaller insect. The pectinate ♀ antennæ separate the moth from the *Ceratocampidæ*. The shape of the wings is like *Eacles*, but on the whole the outline is more like *Hyperchiria*. While structurally remote from any described U. S. genus, it may be catalogued next to *Gloveria* for the present.

Rhododipsa Miniana. n. s.

Eyes naked. Thorax covered with narrow scales. Front full. Thorax lighter honey-yellow or orange; this color spreads over base of fore wings. Fore wings pale smooth clay color, crossed by two broad, vague, mesial white bands. Subterminal line inaugurated by a brilliant wine-red, outwardly oblique, linear scale patch, partly resolved into about three spots. A spot on internal margin. Hind wings brilliant wine red; the internal margin yellowish; indications of yellowish mesial line and the fringes are also of this color. Beneath the disc of primaries is of the same wine-red; and the hind wings are crossed by lines and shades of the same color. Length of fore wing, 10 mil.

The markings of primaries recall *Tamila Velaris*. The fore legs are wanting in the beautifully fresh example sent me by Prof. Snow under the No. 871. Quite as handsome as *R. Volupia* Grote; the red color is very rich. This genus and *Rhodophora* contain highly colored crimson or wine red species.

Bessula. n. g.

Clypeus full. Infra-clypeal plate projecting; fore tibiæ with a claw on the inside at extremity of joint; a succession of three stout spines outside; all the tibiæ spinose. Thorax untufted, hairy. Antennæ of male simple, ciliate beneath. Eyes naked. This form differs from *Pippona Bimatris*, by the slenderer fore tibiæ which have a single stout claw-like spine on the inside; whereas in *Pippona*, which has the same characters, the joint is short and broad and there is a double spine on the inside. The fore wings are also not satiny in *Bessula*, which differs from *Antaplaga*, in the absence of the clypeal process, while in that genus the primaries are unusually produced.

Bessula Luxa. n. s.

♂ ♀. Fore wings and thorax very light, whitish yellow, almost white, hind wings white, immaculate, silky. The fore wings have a curved t. p. line of faint ochrey dots. Two faint cellular dots. A dot or two in place of t. a. line. Sub-terminal line a succesion of similar dots. All these dots are so faint that they are only noticeable in my fresh female specimen. The male, somewhat rubbed, appears almost immaculate. Beneath yellowish white. Costa and apices dusky yellowish; the s. t. line indicated over costal region as a vague, dark shaded mark.

Exp. ♂ 25, ♀ 30 mil. No. 873.

The yellow color is still fainter than in *Oxylos Citrinellus*. This species, especially the female, has a certain false air of *Pareuchaetes*.

Eudryas. Boisd.

The clypeus, wings, feet and antennæ give good generic characters in the moths. If it were necessary to show the complete want of anything like anatomical study on the part of Mr. Strecker, it would be only necessary to point to his reference of *Ciris* and *Copidryus Gloveri* to the genus *Eudryas*. The three genera *Eudryas*, *Copidryas* and *Euscirrhopterus* are abundantly distinguished by the structure of the front and of the wings. The clypeus is smooth and the apices depressed in *Eudryas*. The clypeus has a wide and thin lengthily projected "plate," and the apices are determinate in *Copidryas*. The clypeus has a circular rough projection and the male wings are almost denuded, the apices roundedly produced, the neuration aberrant in the Cuban *Euscirrhopterus*. *Ciris* is distinguished by the pectinate antennæ and shape of wings; it is the lowest of the genera. The group is not Noctuidous, as some Continental authors seem to believe, but related to *Alypia* and *Castnia*, as sufficiently explained by Dr. Packard. I have referred the African genus *Ovios* here, in a former paper, and in my "Catalogue," I call the group *Eudriini*. The list there given is defective and should be amended as follows:

Family ZYGÆNIDÆ.

Sub-family HESPERI–SPHINGES Latreille.

Tribe *Eudriini*.

EUSCIRRHOPTERUS *Grote* (1866).

POEYI *Grote*.
Heterandra disparilis H.–S.
Cuba.

COPIDRYAS *Grote* (1876).

GLOVERI *G. & R.*
Texas; Arizona.

EUDRYAS *Boisd.* (1836).

UNIO *Hubner*.
Eud. brevipennis Stretch.
Canada to South. States: California.
GRATA *Fabr.*
Eud. Assimilis Boisd.
Canada to South. States.

CIRIS *Grote* (1863).

WILSONII *Grote*.
Texas.

LYGRANTHOECIA SPRAGUEI. *Grote*.

The specimen is paler than our Eastern examples, but seems to belong to the same species. One specimen. New Mexico.

EMPLOCIA CEPHISARIA. n. s.

♀. Aspect of *Melanchroia Cephise*. Blue black above, immaculate; the short fringes are white. Beneath black, with the base of both wings on costal region shaded with pale lake red. The collar and fore legs on the inside touched same color. Body black, as are the antennæ and legs. *Expanse* 30 mil.

In this species the primaries *above* at base show an extremely faint sub-costal shade of lake red. One specimen (868).

EMPLOCIA FERVEFACTARIA. n. s.

Above orange, with lead colored margins to the wings broken up into trigonate patches. A large triangular patch on costa beyond the middle and another before apices. Terminal margin banded with lead color, widely above, narrowly below vein four. The lead colored fringes twice interrupted with white on the interspaces between veins two and four. Hind wings with three large marginal leaden patches, one on internal margin, another at anal angle, a third at apices. Outer edge narrowly leaden. A pale apical fleck. Beneath the markings repeated. Primaries orange; the ground color on each side of the leaden triangle at apices becoming pale. Hind wings with the orange color of upper surface replaced by pale clay, a basal dot, two discal dots and superposed costal mark on the pale ground color, distinct. Above these are indicated less distinctly. Wings at base touched with carmine, the costa of fore wings shaded with red. Body pale, head and collar touched with red.

Expanse 32 mil. One specimen (867).

BOTIS VOLUPIALIS. *Grote.*

A fresh specimen (No. 877). In this species the fore wings are colored like *Signatalis*, crossed by two broad clay lines. The inner angulated sub-medially; the outer broader, even, nearly straight. It differs decidedly from its ally in this respect, but is similarly sized and almost as highly colored and pretty a species. Body and hind wings much as in its ally. My original specimen came from the hills west of Denver. *Botis Augustalis* is nearer *Volupialis* than *Signatalis*, while quite different from either.

BOTIS TORALIS. n. s.

Fore wings olive yellow, with a broad terminal vinous border and a basal patch of same color. Thorax yellow olive. Head touched with red. Hind wings thinly scaled, pale fuscous. Beneath pale fuscous; apices of fore wings touched with wine color. Fringes wine-red. On the primaries, beneath, a dark s. t. band and discal mark are indicated. This species hardly looks like a *Botis*, it is similarly sized with *Ventralis*. (No. 872). *Expanse* 26 mil.

Among the species collected by Prof. Snow in Northern New Mexico are *Botis Fracturalis* Zeller (880), *Allectalis* Grote (884,-885), *Tatalis* Grote, (878). All these were described from Texas originally. There is also a specimen of *Emprepes Novalis* (881), much larger than my Texan type.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] November, 1881. [No. 10.

NEW GENERA AND SPECIES OF THE FAMILY ÆGERIDÆ.

By Henry Edwards.

The study of this difficult and little known group has for some time past engaged my attention, and the kindness of many friends throughout the United States, whose generosity shall be hereafter fully acknowledged, has enabled me to become acquainted with a number of new forms. In the course of a few months I hope to be enabled to publish a monograph of the North American species, with colored figures, the difficulty and delay arising from the drawing of the plates presenting the only obstacle to its immediate production.

In the present paper I have described all the species coming into my hands which appear to me to be new to science. I shall be extremely grateful for corrections of any errors of which I may have been guilty, it being hardly possible for me to escape the commission of a few. Through the kindness of Mr. A. G. Butler, of the British Museum, I have obtained admirable colored drawings of Walker's types, the descriptions of which I have copied and added to the present paper. A plate of these species is now being prepared by Messrs. Mintern Bros., London, and will be given (if possible) with the December number of "Papilio."

I here repeat, what I have more than once said, that I shall be deeply indebted for the loan of any species of Ægeridæ, more especially from the southern, western and extreme northern portions of the continent. These shall be carefully preserved and returned as early as possible.

I have scarcely thought it desirable, in the present paper, to give the diagnoses of the genera proposed by previous authors, as these will appear in their proper places in the more extended work.

TROCHILIUM PACIFICUM. n. sp.

Size and aspect of *T. apiforme*, *L.* The forewings have a blackish space at the base, and the borders and nervures of both wings are orange brown, the same color as in the European species. Antennæ, rich brown, paler at the apex. Head, with the front brown, orbits of the eyes and tibiæ pale lemon yellow. Palpi pale yellow. Fore femora and tibiæ pale yellow, bordered inwardly with black. Hind tibiæ and tarsi wholly yellow. Thorax brown on the disk, with two stripes of yellow, broadest at the base, and the tegulæ edged broadly in front with yellow. There is also a yellow spot at the base of the wings, leaving the tegulæ themselves brown. At the junction of the thorax and abdomen are some black hairs, edged with yellow. The abdomen is wholly blackish brown. Of the seven visible segments, the first is without a band, the second has a very narrow golden yellow band in front, the third a broad yellow band in front, sinuously notched in the middle, leaving the centre narrower than the sides, the fourth segment is without a band, the fifth, sixth and seventh are wholly golden yellow, with a waved mark of brownish posteriorly on the fifth and sixth. The anal segment is very long and tapering. Sides of all the segments marked with golden yellow. Underside of abdomen golden yellow for the last five segments.

1 ♂. Washington Ter. (Morrison), 1 ♀. California, (R. H. Stretch).

Types. Coll. B. Neumoegen. J. Akhurst.

The dark tegulæ and the sinuous mark on the third abdominal segment will serve to distinguish this species from *T. apiforme L.* of which it appears to be the Pacific Coast representative.

EUHAGENA. n. gen.

In many respects this genus is similar to *Tarsa* of Walker, but it differs by the proboscis being short, instead of long, by the antennæ being much longer than the thorax, and by the fore and hind wings being opaque. It may be thus characterized: Body short at base, tapering posteriorly, with long anal tuft. Proboscis short. Palpi densely clothed with long hairs, and nearly straight. Antennæ twice the length of the thorax, very deeply pectinated, except at the tip, where the pectinations seem soldered together into a compact mass. Legs long. Tibiæ with long hairs, not so long, however, as in either *Melittia* or *Larunda*. Tarsi naked. Wings all opaque, the hind nearly double the width of the fore pair.

I have dedicated this singular genus to my good friend, Dr. Herman Hagen, of Cambridge, one of the most distinguished of living entomologists, and one to whom I am under special obligations.

EUHAGENA NEBRASKÆ. n. sp.

Antennæ, thorax and abdomen deep velvety black. Thorax with white scales at the sides. Abdomen with the posterior edges of the segments with clear white bands, extending in nearly all the segments entirely around. Anal tuft with white scales. Tibiæ black at their base, the hind pair with long whitish hairs intermixed. Tarsi, unclothed, black, with minute white scales. Forewings rich dark orange, black at the base, along the costa, and narrowly so on the internal margin. Discal mark large, black, triangular. Fringes long, blackish brown. Hind wings, also, rich dark orange, the abdominal margin broadly black, and the ovate discal spot, also black. The course of the nervules in both wings is indicated by black scales. Fringe broad, blackish brown.

Exp. wings. 32 m.m.

1 ♂. Nebraska. (Mr. Austin).

Type. Coll. Cambridge Museum.

A very remarkable form, differing greatly from any other with which I am acquainted

BEMBECIA SEQUOIÆ. n. sp.

♂. Forewings with the margins all black, the costal rather broad. Hind wings with costal margin, and base of the abdominal pale yellow. Beneath, the forewings have the margins lemon yellow, as far as the discal mark, beyond this, black. Hind wings as on the upper side. Head and antennæ jet black. Palpi lemon yellow, black at the sides. Fore femora, orbits of eyes and base of wings beneath lemon yellow. Middle and hind femora black. Tibiæ, lemon yellow, bordered with black. Thorax with collar, tegulæ, two narrow dorsal lines, and a basal line, lemon yellow. Abdomen with all the segments, except the fourth, narrowly bordered with rich lemon yellow. Caudal tuft, yellow below, blackish above.

♀. Similar to the ♂, but a little larger and more robust, the abdominal band broader and better defined.

Exp. wings ♂. 24 m.m. ♀. 30 m.m.

8 ♂. 6 ♀. Mendocino Co., Calif. (O. Baron).

Very destructive to *Sequoia sempervirens*, as well as to some species of *Pinus*.

BEMBECIA SUPERBA. n. sp.

Nearly allied to *B. sequoiæ*, but more delicate than that species. Fore wings with costal margin brownish black, the internal margin and discal mark flecked with golden scales. The base and abdominal margin of hind wings are golden yellow. Beneath, with the exception of the margin of hind wings, and the posterior margin of fore wings, which are brown, the whole of the wings are golden yellow. Head and antennæ black, the latter with yellow hairs at the base. Thorax with collar and rather broad lateral and basal bands golden yellow. Abdomen black, with second segment posteriorly, and fourth, fifth and sixth wholly golden yellow, the color extending to the under side. Caudal tuft golden yellow, blackish in the centre above. Palpi golden yellow, with some black hairs at the sides. Fore coxæ golden yellow without, blackish within. Other coxæ and femora blackish. Tibiæ and tarsi golden yellow, the former marked with black at the joints above.

Exp. wings. 30 m.m.

1 ♀. Washington Terr. (Morrison).

Type. Coll. E. L. Graef.

This may be distinguished from *B. sequoiæ* by its slighter structure, narrower body, golden scales on fore wings, and by the posterior segments of abdomen being wholly yellow and not banded.

LARUNDA. n. gen.

Antennæ moderately pectinated in the ♂, almost simple in the ♀. Palpi. short, with very broad spreading tuft of hairs. Tongue almost obselete. Abdomen very long, sessile, as wide at the base at the thorax. Caudal tuft large, flat, spreading. Hind tibiæ clothed with bunches of long hairs, especially in the ♀. Forewings opaque. Hind pair with small vitreous spot at base.

"Larunda, daughter of Almon, was the nymph who informed Juno of the connection between Jupiter and Juturna. For this Jupiter deprived her of her tongue, and ordered Mercury to conduct her to the lower world. On the way thither Mercury fell in love with her, and she afterward gave birth to 2 Lares." (*Smith's Classical Dict., page* 234.)

LARUNDA SOLITUDA. n. sp.

♂. Head and thorax brownish, collar, small tuft between the eyes, and fore tarsi pale dull yellow. Antennæ dull brown at the base and apex, deep orange in the middle. Hind tibiæ pale yellow, with bunch of orange hairs, which are brownish above. These hairs are very much shorter than those of the genus Mellittia, but are, nevertheless, quite apparent. Forewings quite opaque, dark brown, with a red and yellow shade from base along internal margin, and a streak of same colors in the cell, reaching almost to the apex, but interrupted by the discal mark. Hind wings, vitreous in the spaces between the subcostal and median nerve, and between the median and submedian, the vitreous space terminating before the centre of the wings. Margins, broadly orange red, mixed with brownish scales. Fringes of both wings, olive brown. Abdomen brownish black, with 6 broad pale orange bands, the 1st, 3rd and 5th being narrower than the rest. The 4th is broadest of all, and is carried on beneath the abdomen. Caudal tuft black, yellow in centre. ♀ Similar to the ♂, with band of abdomen, a little narrower and lest distinct.

Exp. wings. ♂. 28 m.m. ♀. 32 m.m.

♂. ♀. Texas (J. Boll.) (Coll. B. Neumoegen. ♀. Kansas (H. Brous.) Coll. C. V. Riley.)

SCIAPTERON GRAEFI. n. sp.

Entire insect purplish black, with very bright metallic reflection. Antennæ and palpi dull black. There are no traces of bands on the abdomen, and the legs are wholly concolorous with the rest of the body. I know of no other species with similar coloration.

Exp. wings. 29 m.m.

1 ♂. 2 ♀. Nevada (Morrison.)

Type. Coll. E. L. Graef, from whom I have received many courtesies, and to whom I dedicate this singular species.

SCIAPTERON SCEPSIFORMIS. n. sp.

Allied to *S. syringæ* Harris, but with the legs much shorter. The forewings are rich golden brown, a little reddish at the base and on the disk. The hind wings are very opalescent, with a rather broad purplish brown margin, the opaque portion being carried a considerable distance along the course of the median and sub-median veins. Discal mark prominent and broad, enclosing an oval vitreous space, crossed by two veins. Abdominal margin brownish orange. The wings beneath are the same as above, except that the costal margin of forewings is yellowish. Antennæ purplish brown, dark orange at the base and at the tip. Palpi and vertex dark orange. Femora dark brown. Tibiæ and tarsi orange, banded with brown. Thorax with very narrow stripes on the sides and broader ones at base, pale yellow. Abdomen brown, with 2nd segment narrowly bordered behind with pale yellow. Anal segments with yellowish shade. Caudal tuft small, as in all the genus, pale brown.

Exp. wings ♂. 25 m.m. ♀ 29 m.m.

1 ♂. 1 ♀. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

SCIAPTERON CUPRESSI. n. sp.

Allied to *Sciap. Robiniæ.*, Hy. Edw., but having the fore wings pale yellow at the base, and purplish brown along the costal margin, not concolorous as in *S. Robiniæ.* The hind wings have the abdominal margins and the base rather broadly golden yellow, the fringes of both wings being golden brown. Beneath, the forewings, as well as the margins of the hind pair, are golden yellow. Antennæ, vertex, and palpi, deep orange. Base of the eyes, pale yellow. All the tibiæ and tarsi, orange, blackish at the joints, and stained in the middle with a deeper shade. Thorax brown, with narrow lateral yellow streaks, and a broader one at the base. Abdomen with basal segment black, the second deep orange, edged posteriorly with pale yellow, the third orange in front, shading into paler yellow behind. All the other segments are deep yellow. Beneath, the abdomen has five pale yellow bands. Caudal tuft, dull orange.

Exp. wings. 30 m.m.

1 ♂. Colorado. (I. Doll.)

Type. Coll. B. Neumoegen.

The chief differences to be found between this and *Sc. Robiniæ* are: the markings of the fore wings, the much darker tibiæ and tarsi, stained with a deeper shade, and the almost wholly yellow abdomen, which in *S. Robiniæ* is blackish for the first three segments, with a narrow yellow line.

SCIAPTERON SYRINGÆ. Harr. *Larva.*

Yellowish white. Head about two-thirds the width of second segment, chestnut brown, with the mouth parts pitchy above, whitish beneath, very shiny, and with a deep triangular sulcus in front. Second segment yellowish, with a waved brownish line posteriorly. Each of the segments bears about eight short brownish hairs. The third segment is slightly broader than the rest, swollen as it were, at the sides. The spiracles are small, brown, those of the second and twelfth segment being larger than the rest. The anal segment is slightly yellow, with many short brownish hairs. All the feet and legs pale pitchy.

Length. 0.80 inch.

In stems of *Syringa Persica*. Albany, N. Y. Dr. James S. Bailey.

In young shoots of *Fraxinus* sp. Long Island. Rev. G. D. Hulst.

In young shoots of *Fraxinus* sp. Ames, Iowa. Herbert Osborn.

CARMENTA. n. gen.

Fore wings quite opaque. Abdomen sessile, and tapering toward anal extremity. Caudal tuft small. Antennæ thickened toward the extremity, as in *Ægeria* proper. In many respects this genus approaches *Paranthrene*, but in that genus, while the anterior wings are opaque, the antennæ are simple, or ciliate.

Type. *Ægeria Pyralidiformis.* Walker.

"Carmenta was the most important of the Camenæ, the prophetic nymphs belonging to the religion of ancient Italy. The traditions which assigned a Greek origin to her worship state that her original name was Nicostrate, and that she was the mother of Evander, with whom she came to Italy."

Smith's Class. Dict. Art. Camenæ.

CARMENTA RUFICORNIS. n. sp.

Fore wings bright golden purple, the golden shades arranged in streaks. Margins of hind wings also flecked with gold. Beneath, the fore wings have the costal edge bright yellow. Antennæ bright brownish orange above, with the tip black. Beneath they are brownish black. Thorax with narrow lateral and basal yellow lines, and with some pale blue metallic scales at base. Abdomen with second and fourth segments narrowly edged posteriorly with pale yellow, the sixth wholly yellow. Between the bands are a few pale blue metallic scales. Caudal tuft black, with the centre beneath yellow. Palpi golden yellow. Coxæ, femoræ, and basal half of tibiæ steel black, the rest of the legs golden yellow, banded with black. The yellow of the legs is of a deeper shade than that of the abdominal band.

Exp. wings. 14 m.m.

1 ♂. Georgia. (Morrison.)

Type. Coll. E. L. Graef.

The reddish orange antennæ, and the blue metallic scales, will serve to distinguish this pretty species from its nearest allies, *C. Pyralidifornis*, Wlk., and *C. Aureopurpuura*, Hy. Ed.

CARMENTA MINUTA. n. sp.

Allied to *C. Pyralidiformis*, Wlk., but differing greatly in size, as well as in other characters. The fore wings are purplish, with a golden reflection. The fringes of both wings are brown. Antennæ black above, yellowish below. Collar pale yellow. Abdomen with third, fifth and seventh segments narrowly edged with pale yellow. Caudal tuft wholly black. Palpi blackish above, golden yellow beneath. Tibiæ and tarsi golden yellow, regularly banded with black.

Exp. wings. 8 m.m.

1 ♂. Georgia. (Morrison.)

Type. Coll. F. Tepper.

The smallest species of this section of the family known to me.

CARMENTA SANBORNI. n. sp.

Bronze black. Fore wings with very minute vitreous space beyond cell. Beneath they are cream yellow for about their basal half, the yellow being flecked with brown scales. Palpi, fore femora, and the posterior edge of fourth and sixth abdominal segments, yellowish white.

Exp. wings. 8 m.m.

2 ♂. 1 ♀. Andover, Mass. (F. G. Sanborn.)

Types. Coll. Boston Soc. Natural History.

CARMENTA FRAXINI. n. sp.

Wholly bronze black. Fore wings with a very small vitreous dash near base, and a bright orange discal dot at extremity of cell. Costal margin greenish black, a purplish tint on the posterior margin. Hind wings vitreous, rather narrowly margined, with a bunch of whitish hairs at their base. Under side of wings a little more golden than the upper. Antennæ, palpi, femora, tibiæ and tarsi, brownish black. Abdomen with no trace of band, except on posterior margin of fourth segment beneath, which is pale yellow. Caudal tuft small, brownish beneath, black above.

Exp. wings. 16 m.m.

1 ♂. Washington, D. C. (C. V. Riley.)

ALBUNA. nov. gen.

Under this name I separate a number of species, which seem to me to possess characters sufficient to form the types of a new genus. Compared with *Ægeria* proper, and taking *Æg. Acerni* as the North American type of that genus, the head is much narrower than the front of the thorax, which is not so far produced beyond the base of the wings. The antennæ are comparatively shorter, stouter and more thickened toward the apex. The palpi are slightly longer and more porrect. The legs are shorter proportionately and the tibiæ more densely clothed with hair. The abdomen of the ♂ is never constricted at the base, is stout, cylindrical, with the caudal tuft small, and not spreading. That of the ♀ is fusiform, quite as broad at base as the thorax, and tapering to a point. The markings of the wings are heavier and broader than in *Ægeria*, the discal mark being always oblique, and the space between the sub-median nervule and the internal marginal nervule always covered with scales. For the group, these are rather large insects, allied to *Bembecia*, but the antennæ are not so deeply pectinated, the body is more fusiform, and the caudal tuft is not spreading.

Type. *Æg. hylotomiformis.* (Walk.)

ALBUNA RESPLENDENS. n. sp.

♂. Fore wings with the whole surface very bright orange red, the costal margin a little shading into golden brown, and the corner of the nervules indicated by golden brown streaks. Hind wings with the margin narrowly orange red. Fringes of both wings golden brown. Beneath, the markings are repeated, but the costal edge of the fore wings is lemon yellow. Head and antennæ black, the former with some blue metallic scales between the eyes. Thorax with broad lateral and narrow basal stripe, golden yellow. Abdomen with first, second and third segments broadly banded posteriorly with golden yellow, fifth, sixth and seventh wholly golden yellow, as is also the caudal tuft. Under side of abdomen, palpi, coxæ and all the legs golden yellow, the tibiæ banded at the joints with black. ♀. Similar to the ♂, but a little more robust, the posterior segments of abdomen banded with, but not wholly, golden yellow.

Exp. wings. 23 m.m.

1 ♂. Soda Springs, Siskiyou county, Cal. (I. Behrens.) 2 ♀. Sierra Nevada, Cal. (S. Brannan.)

Type. Coll. Hy. Edwards.

ALBUNA RUTILANS. n. sp.

Fore wings with the costal margin broadly purplish brown, the internal and posterior margins deep golden yellow, not by many degrees of so red a shade as in the preceding species. The nervules are marked by brownish streaks. Hind wings with costal margin lemon yellow, the outer margin deep golden yellow, edged anteriorly by a narrow brown band. The fringes of both wings are golden brown. Underside of wings pale golden yellow, the rest of the markings repeated. Head and antennæ dull black. Thorax with the usual narrow lateral and basal yellow lines. Abdomen with all the segments banded with pale golden yellow, the third and fifth being the widest. Caudal tuft golden yellow, black in centre and at the sides. Palpi and all the legs golden yellow, the tibiæ banded at the joints with black.

Exp. wings. 20 m.m.

1 ♀. Virginia City, Nevada. (H. E.)

Type. Coll. Hy. Edwards.

ALBUNA RILEYANA. n. sp.

In this, which very closely resembles some of the Pacific Coast forms, the fore wings are wholly golden brown, except the discal mark and the basal half of internal margin, which are reddish orange, and the base, which is jet black. The hind wings have the transverse mark and the base of abdominal margin reddish orange. Fringes of both wings golden brown, except that of the abdominal margin, which is yellow. Beneath, the markings are strongly repeated. Head black. Antennæ brown, paler at the base. Thorax with narrow lateral and broad basal, yellow streaks. Abdomen with all the segments, except the first, equally banded with pale golden yellow, the bands extending underneath. Caudal tuft brownish, speckled with yellow. Palpi, coxæ and all the legs golden yellow, the tibiæ banded with black at the joints.

Exp. wings. 24 m.m.

1 ♀. Cadet, Missouri. (Prof. C. V. Riley.)

ALBUNA ARTEMISIÆ. n. sp.

Fore wings greenish black, especially so along the costa. The internal margin, some streaks on the posterior margin and the posterior portion of discal mark, dull orange. Costal and abdominal margins of hind wings, pale lemon yellow. Fringes of both bluish black. Fore wings beneath have the costal and internal margins lemon yellow, hind portion of discal mark, dark orange, and posterior margin streaked with pale orange. Hind wings as on upper side. Head and antennæ black. Collar deep lemon yellow, as are also the sides of the thorax. Abdomen with the segments banded posteriorly with bright yellow. The first and second bands are very narrow; the third is notched posteriorly; the fourth without band. The remaining segments are very broadly banded. Caudal tuft, black above and beneath, with a few yellow hairs at the sides. Palpi yellow, brown at their tips. Fore coxæ, blackish, yellow at the sides. Middle and hind coxæ wholly black. Fore tibiæ brownish yellow, banded with black. Middle and hind tibiæ, bright yellow, bluish black above. Tarsi, all yellow.

Exp. wings. 18 m.m.

1 ♂. Sier. Nev. Calif. (H. E.) on flowers of *Artemisia vulgaris.* L.

ALBUNA MONTANA: n. sp.

♂. Forewings with the costal and posterior margins bronze black, with a few silvery scales at the base. The discal mark is broad, oblique, widest at the costal edge, as in all the genus. The internal margin is reddish orange for about ⅔ of its length, and the discal mark is also edged posteriorly with the same color. The lower wings have the base stained with dull orange, and most of the nervules are the same color. The fringes of both wings are brown. Beneath, the wings are pale dull orange for about their basal ⅔. Posterior margin and discal mark, dull brown. Head and antennæ black, the latter brownish beneath. Orbits of eyes, white. Collar, cream color. Thorax black, with the base and the tegulæ behind, cream color narrowly. Abdomen with 1st, 2nd, 4th, 5th, 6th segments, edged posteriorly with cream color, the bands extending to the lower side. Caudal tuft black, sprinkled with a few yellow hairs. Palpi, cream color. Fore coxæ lead color, white on the outer edge. Femora reddish brown. Tibiæ, pale yellow, banded with black at the joints.

♀. Generally a little larger than the ♂, with the red on the forewings more distinct, and the yellow of the abdominal band of a brighter tint.

Exp. wings. ♂. 25 m.m. ♀. 32 m.m.

21 Examples. ♂. ♀.

White Mountains, N. H. (Morrison. Grote.) Nevada, Colorado. (Morrison.) Anticosti Isld. (Couper.) Sier. Nevada, Cal. (H. E.)

Colls. Tepper, Graef, Neumoegen, W. Grey, Dr. Bailey, Hy. Edwards, etc., etc.

A very variable insect, and of wide distribution, passing probably by degrees into the following species.

ALBUNA TANACETI. n. sp.

Probably a variety of *A. montana.* It is smaller, and the reddish orange of the forewings is more distributed over the whole surface, both above and below.

Exp. wings.

Several examples ♂. ♀. Colorado, (H. K. Morrison.) Mt. Hood, Oregon, (Morrison.) Califor., Sier. Nev., Cal., Vancouver Isld. (H. E.)

Colls. Neumoegen, Graef, Tepper, Hy. Edwards.

It is possible that both this and the preceding species are forms of Walker's *Æg. hylotomiformis.*

ALBUNA VANCOUVERENSIS. n. sp.

Much blacker than *Al. montana.* A heavy reddish orange line between the sub-median nervule and the internal margin, and the under side of wings are slightly marked with reddish orange. Legs almost entirely black. In fresh specimens the bands of posterior abdominal segments are composed of silvery blue scales.

Exp. wings. 22 m.m.

7 examples. ♂. ♀. Vancouver Isld. (H. E.) Colorado, (Morrison.)

Type. Coll. Hy. Edwards.

ALBUNA COLORADENSIS. n. sp.

In this form the reddish orange is entirely obliterated, and the insect bears a near resemblance to the following: (*A. torva.*) It differs from that species, however, by having the abdomen banded faintly with silvery blue scales, as in *A. Vancouverensis*, and by the presence of a few scales of the same color in the vitreous spaces of the fore wings. It is smaller also, and the under side of the wings has a golden reflection, not seen in either *Al. Vancouverensis* or *Al. torva.*

Exp. wings. 21 m.m.

1 ♀. Colorado. (H. K. Morrison.)

Type. Coll. Hy. Edwards.

ALBUNA TORVA. n. sp.

Entirely dull, brownish black, wholly unrelieved by any other color, with the exception of a very narrow whitish posterior margin to the three basal abdominal segments, which is scarcely visible without a lens.

The only species, so unicolorous, known to me.

Exp. wings. 22 m.m.

3 ♀. Glen. Mt. Washington, N. H. Vancouver Isld. (H. E.) Colorado, (Morrison.)

Types. Coll. Bost. Soc. Natl. Hist. Hy. Edwards.

ÆGERIA FLAVA. n. sp.

Size of *Æg. tipuliformis* L. Fore wings with a bright golden yellow cast, which pervades even the vitreous space. Costal margin, golden brown. Discal mark, golden brown in front, edged posteriorly with rich orange. Vitreous space continued nearly to the posterior margin marked only by the nervures. Costal margin of hind wings golden yellow, other margins golden brown. Antennæ bright dark orange, brownish at the base. Palpi, collar, and fore femora lemon yellow. Tibiæ and tarsi golden, brownish without, and slightly banded with black. Thorax with base and two very distinct stripes on sides, lemon yellow. Abdomen with all the segments distinctly banded with lemon yellow, that of the fourth segment being the broadest. Beneath the abdomen is deep lemon yellow. Caudal tuft yellow, black in the centre.

Exp. wings. 16 m.m.

1 ♀. Colon. Isth. Panama. (T. L. Mead.)

Type. Coll. Hy. Edwards.

ÆGERIA AURATA. n. sp.

Small, size of *Æg. ceriiformis* Led. Fore wings wholly vitreous at the base, with the exception of the margins, of which the costal is rather broad, brown, edged posteriorly with gold. Posterior margin, gold color, with the nervules marked with purple. Hind wings edged narrowly with gold on costal, golden brown on other margins. Under side of wings same as the upper. Palpi and legs wholly golden, the latter faintly banded with a darker shade. Antennæ, golden beneath, brown above. Thorax and abdomen brownish, the former with the sides golden yellow, the latter with all the segments banded with golden yellow, the two middle bands being the widest. Beneath the abdomen is wholly golden yellow, and the caudal tuft is the same color.

Exp. wings. 11 m.m.

1 ♂. Panama. (H. E.)

Type. Coll. Hy. Edwards.

ÆGERIA CORNI. n. sp.

Allied to *Æg. acerni.* Clem. Costal and posterior margins of fore wings, large discal spot, linear internal margin, and narrow margin of hind wings dull black. Palpi, collar and underside of caudal tuft, bright orange. Pectus and fore femora, pale yellow. Antennæ black, fuscous at the apical third. Tibiæ and tarsi, blackish without, yellow within. Spurs, pale orange. Thorax and abdomen purplish black, the former with a few lateral hairs, and the latter with a slight golden reflection. No bands.

Exp. wings. 15 m.m.

1 ♂. On *Cornus sericea* L. Purgatory Swamp, Mass. (Mrs. Hy. Edwards.)

Type. Coll. Hy. Edwards.

ÆGERIA SAXIFRAGÆ. n. sp.

Allied to *Æg. fulvipes,* Harris, but differing from it by having the abdomen wholly blue black, above and below, and the antennæ also wholly black. Both pairs of wings have some reddish orange scales at their base, and the under side of caudal tuft is also reddish orange.

Exp. wings. 15 m.m.

1 ♂. Colorado. (Morrison.)

Type. Coll. Hy. Edwards.

ÆGERIA VERECUNDA. n. sp.

At first sight like *Æg. lycopsiformis* Esp., but the fore wings are almost entirely opaque. The fore wings are blackish brown along costal margin. The course of the sub-median nervule, the discal mark, and the extreme posterior margin are also the same color. The rest of the wing, including the spaces usually vitreous, is sordid white. Hind wings have a brassy tinge, and are blackish at their base. Fringe, bronze black, edges, sordid white. Both wings, beneath sordid white, clouded with bronze black. An tennæ, blackish brown above, ash color beneath. Head in front, sordid white, crown yellowish. Palpi, orbit of eyes, fore coxæ, collar, lateral and basal stripes of thorax, sordid white. Abdomen with second segment blotched with sordid white, the fourth and sixth with narrow band of same color posteriorly, that of the fourth extending to the underside. Caudal tuft wholly black. Tibiæ and tarsi bluish black, speckled with sordid white.

Exp. wings. 20 m.m.

1 ♂. 2 ♀. Colorado. (Morrison.)

Type. Coll. Hy. Edwards. F. Tepper.

A very aberrant species as regards its coloration.

ÆGERIA BRUNNEIPENNIS. n. sp.

Fore wings rich brown, black at extreme base, the interior margin for half its length, and the posterior half of discal mark, reddish orange. The hind wings have a reddish orange shade at the base of abdominal margin. Fringes of both wings golden brown. Beneath, the wings are yellowish at their base for about half their length. Costa of hind wings orange, the rest as on upper side. Antennæ and head dull black, front deep yellow. Thorax black, with round blotch at base of wings, tegulæ behind and base, golden yellow. Abdomen with the posterior margins of second and third segments narrowly, and fourth, fifth and sixth broadly edged with golden yellow. Palpi, fore coxæ, and hind tibiæ golden yellow, the latter banded at the joints with black. Fore and middle tibiæ rather darker in color.

Exp. wings. 23 m.m.

1 ♀. Georgia. (Morrison.)

Type. Coll. F. Tepper.

ÆGERIA RUBROFASCIA. n. sp.

Fore wings purplish black, the median nervule running posteriorly very close to the internal margin, the discal mark is, therefore, very long, both its edges being nearly straight. Beneath, the fore wings have some streaks of straw color along the costal edge and at the base. Fringes, above and below, purplish brown. Head, thorax and abdomen, purplish black, the latter having the fourth and fifth segments wholly reddish orange. Caudal tuft hastate, purplish black, with the tip whitish. Palpi, coxæ, femora and tibiæ, dull black, with metallic lustre. All the tarsi and spurs sordid white.

Exp. wings. 20 m.m.

1 ♂. Georgia. (Morrison.)

Type. Coll. E. L. Graef.

ÆGERIA BOLLI. n. sp.

Fore wings dense black on the margins, the spaces between the veins on the posterior margin, orange. The wings are wanting in the purple reflection common to many species. Fringes, broadly brownish black. Beneath the markings of the upper side are repeated. Head blackish brown, collar a dull yellow. Antennæ blue black. Thorax narrowly yellow at sides and base. Abdomen with first, second, third, fourth and seventh segments narrowly edged with yellow posteriorly, the band not extending underneath. Caudal tuft, black above, narrowly orange at the sides, orange beneath, except the base, which is black. Palpi orange, the tip brown. Fore coxæ, deep yellow. Tibiæ without brownish yellow, within golden yellow. Tarsi and spurs golden yellow, the former banded with black.

Exp. wings. 21 m.m.

1 ♂. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

Dedicated to the memory of Jacob Boll, an earnest and accomplished entomologist.

ÆGERIA LUPINI. n. sp.

Forewings purplish black, with bright golden reflection, the golden color being spread over the whole of the opaque space, which, with the costal and internal margins, are broad, leaving but small vitreous spaces. Costal margin of hind wings, lemon yellow, hind margins golden brown, with the extreme edge bright golden. Beneath, the forewings are wholly golden yellow, the discal marks, and the nervular streaks of posterior margins, purplish. Hind wings with the margins, broadly golden yellow. Head with the front, brown black, deep yellow at the base of antennæ. Collar deep yellow. Thorax with very narrow lateral line, and the scutellum, pale yellow,. Abdomen with the 3rd segment anteriorly, and the 5th posteriorly edged with pale yellow. The other segments without bands. Caudal tuft black above, orange at the sides, and pale yellow beneath, with the base black. Antennæ blue black. Palpi pale yellow, with black hairs beneath. Fore coxæ yellow without, blackish within. Middle and hind coxæ and tibiæ blackish, the latter with the outside pale yellow. Tarsi all yellow.

Exp. wings. 14 m.m.

2 ♂ 1 ♀. Marin & Mendocino Cos., Calif. (H. E. and O. Baron.)

Type Coll. Hy. Edwards.

ÆGERIA PERPLEXA. n. sp.

Very nearly allied to *Æg. tipuliformis* L., but smaller, with the discal mark more triangular, and the internal margin broader. The forewings are clouded with orange along the internal margin, and the fringes are golden brown. The antennæ are brownish for their basal third, black at the apex. Abdomen steel blue, with the edges of the third and fifth segment narrowly bordered posteriorly with pale yellow. Caudal tuft blackish above, orange at sides and beneath, except at base, where it is black. Under side of forewings golden yellow, with the discal mark purplish black, as also are the courses of the nervules on the posterior margin. Palpi yellow above, with blackish hairs beneath. Fore coxæ blackish, with the exterior edge pale yellow. The fore and middle tibiæ are blackish above, pale yellow beneath. Hind tibiæ, yellow, banded with black. All the tarsi yellow, speckled with black.

Exp. wings. 13 m.m.

1 ♂. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

ÆGERIA IMPROPRIA. n. sp.

Forewings bronze black, with the internal margin rather broad, and enclosing an orange line. The intronervular marks of the posterior margin are also orange, as are the edges of the discal mark. Fringes of both wings, bronze black. Antennæ steel blue. Head and thorax brownish black, with the collar and narrow lateral stripes, pale yellow. Abdomen with second and fourth segments edged posteriorly with pale yellow. Caudal tuft, black above, orange at the sides, black beneath, except the tip, which is orange. Palpi yellow above, black beneath, tip also black. Legs as in *Æg. perplexa.*

Exp. wings. 15 m.m.

2 ♂ Marin Co. and Sier. Nev. Cal. (H. E.) 1 ♀. Washington Ter. (Morrison,)

Types Coll. Hy. Edwards. B. Neumoegen.

ÆGERIA SEXFASCIATA. n. sp.

Forewings golden purple, darkest along the costa, the intronervular spaces being bright gold. Fringes of both wings, golden brown. Beneath, marked as on the upper side, but with the costal and internal margins bright yellow. Head brownish, front with silvery greenish scales. Antennæ black. Thorax with collar and rather broad lateral stripes, deep yellow. Abdomen with all the segments except the fifth narrowly bordered posteriorly with pale yellow. Caudal tuft, purplish black above, pale yellow beneath, sides pale yellow. Palpi and anterior coxæ pale yellow. Tibiæ, pale yellow, banded with purplish black.

Exp. wings. 20 m.m.

2 ♂ Texas. (J. Boll. Belfrage.)

Types Coll. Hy. Edwards, B. Neumoegen.

ÆGERIA CORUSCA. n. sp.

Allied to *Æg. sexfasciata*, but smaller and much brighter in color. The forewings are purplish along the costa, coppery along the course of the nervules, bright golden in the intronervular spaces, and along the internal margin. The discal mark is also bright golden. Abdominal margin of hind wings pale yellow, the rest golden brown. Fringes of both wings brown. Beneath, the yellow is pale, the markings being repeated in a less prominent degree. Head brownish, with shining blue metallic scales between the eyes. Antennæ, purplish brown above, reddish beneath, especially at the base. Thorax purplish brown, with very narrow lateral and basal lines of pale yellow. Abdomen purplish brown, with a few scattered bluish scales, the first, second, third, fourth and sixth segments very narrowly banded with pale yellow, the bands not extending beneath the abdomen. Caudal tuft, purplish brown, a little yellow beneath. Palpi pale yellow, terminal article, brownish. All portions of the legs pale yellow beneath, purplish brown above, except at the joints, where they are pale yellow.

Exp. wings. 14 m.m.

1 ♂. Texas. (Belfrage.)

Type. Coll. Hy. Edwards.

ÆGERIA AUREOLA. n. sp.

Color and size of *Æg. uroceriformis*, to which species it is closely allied. Forewings purplish brown, along two-thirds of costal margin. Discal mark also purplish brown, as are also the courses of the nervules. The rest of the wing, bright golden orange. Margin of hind wing, purplish brown, with orange line at base of the fringe. Fringes of both wings golden brown. Under side, lemon yellow, except the discal mark and the ends of the nervules, which are purple brown. Head and antennæ black, the latter with basal joint, golden yellow. Thorax with lateral and basal lines golden yellow. Abdomen with second, fourth, and sixth segments broadly yellow behind. First has very narrow line, third without band, and fifth with scattered yellow scales. Caudal tuft golden yellow, black in centre. Palpi, fore coxæ, pectus, and legs golden yellow, the tibiæ banded at their joints with purplish black.

Exp. wings, 19 m.m.

1 ♀. Nevada. (Morrison.)

Type. Coll. E. L. Graef.

ÆGERIA CONSIMILIS. n. sp.

So closely allied to the European *Æg. cephiformis*, Ochs. as to be very difficult to distinguish them. The present species is blackish brown, the posterior margins of forewings, with golden reflection. The palpi are wholly golden yellow, except the terminal joint, which is black. The base of the wings beneath, the fore femora, the whole of the tibiæ and tarsi inwardly are pale golden yellow, as are also the abdomen beneath and the sides of caudal tuft below. Outwardly, the middle and hind tarsi are black, banded with golden yellow. The bands on abdomen are five in number, very narrow, pale yellow.

Exp. wings, 20 m.m.

1 ♂ Dorchester, Mass. (P. S. Sprague.)

Type. Coll. Boston Soc. Natl. History, No. 1345.

The chief difference between this species and *Æg. cephifor-*

mis is as follows: In the European species the palpi are black at the sides, the abdomen black beneath, with the rings plainly shown, and the tarsi are wholly yellow, ringed with black, and not as in the present form, yellow only inwardly.

The ♀ of Æg. consimilis is unknown to me.

ÆGERIA HYPERICI. n. sp.

The nearest European ally to this species is *Æg. ichneumoniformis*, S. V. The margins of the wings are all very narrow. Costa and base of forewings, bronze brown. Internal margin, and discal mark, reddish orange. Posterior margin, and margin of hind wings, golden brown, with the fringes a little paler. Wings beneath, same as on the upper side. Head, antennæ, exterior of palpi, thorax and abdomen black, all the segments of the latter, above and below, narrowly bordered with lemon yellow. Interior of palpi, fore femora, and the whole of the tibiæ and tarsi golden yellow. The middle and hind femora are black, and there are small spots of black on the tibiæ, at the junction of the spurs. Caudal tuft, alternately black and yellow.

Exp. wings, 24 m.m.

2 ♀. West Virginia. T. L. Mead.

Types. Coll. Hy. Edwards.

ÆGERIA EUPATORII. n. sp.

Head and antennæ blackish brown, the latter obscurely banded near the apex with sordid white. Thorax and abdomen purplish brown, the former with a narrow line on the sides, and the scutellum dull golden yellow. The segments of the abdomen are narrowly bordered posteriorly with the same color, the bands of the third and fifth being the least conspicuous. Caudal tuft dull orange. Palpi whitish beneath, dull yellow above, with the terminal article light brown. Anterior coxæ and tibiæ dull yellow. Middle and posterior coxæ and tibiæ, pale lead color with golden tint. All the tarsi dull yellow, the posterior pair banded with purplish brown near the joints. Fore wings golden brown, with reddish orange scales, the opaque spaces varying in their width. Fringes of both wings golden brown. Underside of fore wings golden yellow along costal and interior margins, purplish brown at posterior margins, marked with golden streaks.

Exp. wings, 23 m.m.

2 ♀. Long Island, N.Y. In stems of *Eupatorium purpureum. L.* Mr. S. L. Elliot.

ÆGERIA INFIRMA, n. sp.

Very delicate in appearance, with the margin of forewings extremely narrow, straw yellow, the discal mark large, black, as is also the posterior marginal patch. The hind wings have the veins and margins remarkably fine. The color of thorax and abdomen is the same as in *Æg. eupatorii*, but the abdominal bands are narrower and fainter. The caudal tuft deep rich orange.

Otherwise as in *Æg. eupatorii*, of which species it may possibly be the ♂.

Exp. wings, 18 m.m.

1 ♂. Long Island, N. Y. (S. L. Elliot.)

Type. Coll. S. L. Elliot.

ÆGERIA IMITATA. n. sp.

Closely allied to *Æg. eupatorii*, but differing from it by having the antennæ very distinctly banded with clear white for the apical half, the basal half being steel blue. The thorax has the base *wholly* pale yellow, the bands of the abdomen are wider than in *Æg. eupatorii*, and the caudal tuft has the central portion brown, while the tibiæ are blackish, with purple reflection.

Exp. wings, 21 m.m.

1 ♂. Pennsylvania.

Type. Coll. B. Neumoegen.

ÆGERIA MORULA. n. sp.

Size and aspect of *Æg. stelidiformis*, Frr. Fore wings with the margins very broadly black, vitreous spaces sordid white. Fringes of both wings, brownish black. Under side of forewings sordid white, except discal mark, nervules, apex and posterior margin, which are black. Antennæ and legs wholly black, except the underside of tarsi and the spurs, which are sordid white. Palpi, narrow lateral stripes on thorax and three narrow bands on abdomen sordid white. Caudal tuft black above, sordid white beneath.

Exp. wings, 20 m.m.

1 ♂. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

ÆGERIA KOEBELEI. n. sp.

Purplish black, the posterior margins of fore wings with slight golden reflection. The base of internal margin and of the median nervule is very pale yellow. Margins of hind wings extremely delicate. Beneath, the fore wings are very pale yellow, deeper at the posterior margin, and there shaded with gold and purple. Head black on crown, with some pale golden metallic scales in front. Orbits of the eyes white. Antennæ black, with rufous stain near the apex, only visible above. Thorax has collar, front and sides clothed with scales of peculiar blue metallic lustre. Abdomen similarly clothed, with second and fourth segments narrowly banded with very pale yellow, the band of fourth segment reaching beneath the abdomen. Caudal tuft brassy black, yellow beneath, and with fine yellow hairs at the sides. Fore coxæ white, as is also the pectus, the latter bordered by pale blue metallic scales. Femora and tibiæ yellow beneath, marked with purple black at the joints above. Tarsi speckled with black at the joints above, yellow beneath.

Exp. wings, 13 m.m.

1 ♂. Tallahassee, Florida. (A. Koebele.)

Type. Coll. Hy. Edwards.

I have dedicated this pretty species to its captor, who is one of the most earnest and observant collectors in the United States.

ÆGERIA WASHINGTONIA. n. sp.

Deep black, the vitreous space behind discal mark being nearly circular. The fore wings have very slight golden tinge, produced by a few golden scales scattered along the posterior margin. Abdominal margin of hind wings slightly yellowish, the rest brownish black. Head and antennæ black, the latter rusty beneath. Thorax with short, narrow lateral line at base of wings, no basal line. Abdomen with second segment very narrowly, fourth broadly banded with yellowish white. Caudal tuft black, pale orange at the sides. Palpi deep yellow within, blackish without. Legs nearly all black, flecked with yellow scales, the tibiæ with the anterior portion banded with yellow.

Exp. wings, 19 m.m.

1 ♂. Washington Terr. (Morrison.)

Type. Coll. Hy. Edwards.

ÆGERIA DECIPIENS. n. sp.

Fore wings with the vitreous space beyond the cell unusually large, leaving only a very narrow posterior margin. The costal margin is brown, the discal mark orange, and the posterior margin golden, with the lines of the nervules blackish. Fringes of both wings golden brown. The under side is golden yellow, streaked by the nervules as above. Head and antennæ black, the latter dusky at the tip, and with a few yellow hairs at base. Thorax brassy black, with no lateral, but rather broad basal line divided in the centre. Abdomen brassy black, second segment very narrowly, fourth broadly and sixth narrowly edged with pale yellow. Between the bands are some pale blue metallic scales. Caudal tuft hastate, black, pale yellow at the sides. Palpi blackish above and without, yellow within. Tibiæ and tarsi golden yellow, banded with black.

Exp. wings, 15 m.m.

1 ♂. Colorado. (Morrison.)

Type. Coll. E. L. Graef.

ÆGERIA NEGLECTA. n. sp.

Fore wings nearly opaque, the usual vitreous spaces being thinly clothed with scales. The discal mark is, however, apparent, and is large and blackish. The ground color of the wings is golden brown, with bright gold scales scattered over the surface. Margins and fringes of both wings golden brown. Beneath, the wings are golden yellow, with purplish lustre, flecked with brown scales. Discal mark purplish. Fringes of both wings golden, with brown ciliæ mixed. Head and antennæ brownish black. Thorax with narrow lateral and basal pale yellow stripes. Abdomen with second and fourth segments narrowly banded posteriorly with very pale yellow. Caudal tuft brownish, the tip yellow beneath. Palpi, pectus, fore coxæ, base of tibiæ and tarsi pale dull yellow. Femora brownish black. Tibiæ broadly banded with black at the joints. Tarsi speckled with black.

Exp. wings, 15 m.m.

1 ♂. Olympia, Washington Ter. (H. E.)

Type. Coll. Hy. Edwards.

ÆGERIA IMPERFECTA. n. sp.

Fore wings golden purple, the golden shades being chiefly along the base of internal margin and the intronervular spaces. The usual vitreous space behind the discal mark is here almost obsolete, its position being covered with scales. Fringes golden brown. Beneath, the wings have a most brilliant opalescent tint, with the colors and markings of the upper side repeated. Head and antennæ dull black. Thorax with narrow basal, but no lateral lines. Abdomen with first, second, third and sixth segments very narrowly banded behind with pale yellow. The fourth segment has a wide band, reaching beneath the abdomen, which the others fail to do. Caudal tuft brassy black, yellow at the sides. Palpi blackish beneath, yellow at the tips. Coxæ and femora blackish. Tibiæ and tarsi yellow, the former banded at the joints.

Exp. wings, 13 m.m.

1 ♂. Colorado. (Morrison.)

Type. Coll. Hy. Edwards.

ÆGERIA HEMIZONIÆ n. sp.

Fore wings rich golden brown with purplish reflection. All the borders are broad, leaving in consequence a small transparent space. The veins of the posterior margin are distinctly black- Discal mark purple black, orange posteriorly, with golden reflec. tion. Hind wings with margins golden. Fringes of both wings golden brown. Head black, with several shining pale blue scales in front. Antennæ dull black. Thorax with the collar, tegulæ and base lemon yellow. Abdomen with all the segments banded posteriorly with deep lemon yellow, the bands on first and third being the narrowest. Caudal tuft deep lemon yellow, with the centre blackish. Beneath, the whole of the margins of the wings are bright deep golden, the discal mark of fore wings reddish orange. Palpi, fore coxæ and tibiæ lemon yellow, the latter banded with brown at the junction of the tarsi. The abdomen has all the segments beneath very narrowly banded posteriorly with pale yellow.

Exp. wings, 18 m.m.

2 ♂ 1 ♀. Nevada. On *Hemizonia luzulifolia*. D. C. (H. E.)

Type. Coll. Hy. Edwards.

ÆGERIA SENECIODES. n. sp.

Allied to the preceding species, but larger, with the internal margin of forewings transparent below the submedian nervule, the transparent space reaching nearly to the base. The color of the wings is reddish orange, without any of the purplish tint of *Æg. hemizoniæ,* and the caudal tuft is much wider, with the centre lemon yellow, sides blackish, and wholly lemon yellow beneath, except the base, which is black. The abdomen beneath is very broadly banded with yellow. The fore wings beneath have the discal mark reddish orange and the posterior margins purplish brown.

Exp. wings, 22 m.m.

1 ♂. California. On *Senecio Douglassii.* D. C. (H. E.)
1 ♀. Nevada. (H. K. Morrison.)
Types. Coll. Hy. Edwards. F. Tepper.

ÆGERIA REFULGENS. n. sp.

Very bright golden brown. The fore wings very narrow, costal edge brown. Discal mark brown in front, reddish orange behind. Vitreous space small, linear. Fringes of both wings golden brown. Beneath the wings are brighter than above, the intronervular spaces being bright golden orange. Head and antennæ black. Thorax black, with very narrow golden yellow streak at sides, and a broader one at the base. Abdomen black, second, fourth and sixth segments banded behind with golden yellow. Caudal tuft black, golden yellow at the sides. Palpi, tibiæ, coxæ and tarsi golden yellow, the tibiæ black at the joints.

Exp. wings, 19 m.m.
1 ♂. Georgia. (Morrison.)
Type. Coll. F. Tepper.

ÆGERIA OPALESCENS. n. sp.

Steel blue, the fore wings with the opaque spaces greenish black, the vitreous spaces very opalescent, with a few silvery scales. Hind wings with bright opalescent reflection. Fringes of both wings purplish black. Beneath, the silvery scales of fore wings are much more numerous, extending over the whole vitreous surface. Head, palpi and antennæ deep jet black. Thorax concolorous with fore wings. Abdomen dark steel blue. The whole of the under surface greenish black, the tibiæ having at their base a tuft of whitish hairs. Spurs whitish, speckled with black.

Exp. wings, 28 m.m.
3 ♂. Virginia City, Nevada. (H. E.)
1 ♀. Colorado. (Morrison.)
Type. Coll. Hy. Edwards.

ÆGERIA NOVAROENSIS. *Behrens.* M. S.

♂. Head, palpi, collar, tegulæ, large spot on disk of thorax and one at base, rich orange red. Abdomen blue black, with six orange red bands above, and wholly orange red beneath. Caudal tuft wholly orange red. The tibiæ and tarsi are the same rich color, ringed at the base with steel blue. Both wings opalescent, the anterior pair with the costal margin narrowly, and the posterior margin broadly, bluish black. Discal mark large, bluish black. Antennæ dull black.

♀. Similar to the ♂, but with the abdominal band rather narrower, and the hind tibiæ and tarsi dusky.

Exp. wings, 34 m.m.

1 ♂. Soda Springs, Siskiyou Co., Cal. J. Behrens.

1 ♀. Novaro, Mendocino Co., Cal. J. Behrens.

Types. Coll. Hy. Edwards.

ÆGERIA GILIÆ. n. sp.

Allied to the European *Æg. asiliformis*, Rott. The narrow costal border of fore wings, the moderate posterior margin, and the almost obsolete internal margin are golden brown, the discal point at termination of cell (discal mark) reddish golden. The narrow marginal border of hind wings, and fringes of both, golden brown. Under side of fore wings bright yellow at base, and along two-thirds of costal margin, where it gradually shades into golden brown. Discal mark reddish orange. Hind wings also bright yellow at base, and along half the costal edge, where the color shades into golden brown. Fringes of both wings as on the upper side. Antennæ blackish brown. Palpi and pectus lemon yellow. Tibæ yellow, black posteriorly. Hind tarsi flecked with dusky. Thorax bluish black on disk, with the sides narrowly lemon yellow. Abdomen with three distinct and rather broad bands of lemon yellow, which are widened greatly on the under side, making this nearly all yellow. Caudal tuft yellow, with a few black hairs intermixed.

Exp. wings, 24 m.m.

1 ♀. Colorado. (Morrison.)

Type. Coll. Hy. Edwards.

This species differs from *Æg. asiliformis*, Rott., in the browner color, and the discal mark being concolorous with the borders, while in *Æg. asiliformis*, the latter are black, and the discal mark fiery red, being thus thrown into strong contrast with the other portions of the wing. The abdominal bands, too, in *asiliformis* are distinct, both above and below, while in *giliæ* they are beneath almost joined into one yellow space, scarcely showing the division of the segments.

ÆGERIA MIMULI. n. sp.

Allied to the previous species. Fore wings with the extreme base black, and beyond this a longitudinal fiery reddish streak. Costal and internal margins golden brown. Posterior margins much paler, almost pure gold color. Discal mark, fiery reddish orange. Hind wings with the narrow margin golden brown. Fringes of both wings a little paler than the margins. Antennæ, black above and below, pale buff at the sides. Front, palpi, and pectus, cream white. Femora bluish black. Tibiæ whitish in their centre, steel blue at both extremities. Tarsi a little deeper yellow, speckled with black. Thorax and head black, the former with the collar, sides and base very pale yellow. Abdomen with six very pale yellow bands, the second and fourth being half the width of the others. Caudal tuft composed of pale yellow and black hairs, equally mixed.

Exp. wings, 22 m.m.

1 ♂. Colorado. (Morrison.)

Type. Coll. Hy. Edwards.

At first sight this species appears to be very close to *Æg. giliæ*, but it has double the number of abdominal bands, and is a paler insect, with the fore wings decidedly narrower.

ÆGERIA MADARIÆ. n. sp.

Fore wings rich golden purple, with the golden shade most apparent at the posterior margin. Vitreous space very small, reduced to a mere line before, and a minute circular spot behind the discal mark, the latter space almost closed by the black nervules. Margin of hind wings golden brown. Beneath, the fore wings are golden, with purple brown costal streak, and the nervules are also purple brown. The margin of hind wings are paler than above. Palpi, fore and middle femora, and hind tarsi, pale golden yellow. Antennæ black. All the tibiæ marked with black at the junction of the spurs. Collar, sides of thorax, and posterior margins of first, fourth and seventh segment of abdomen, pale yellow. Abdomen purplish black on lower side. Caudal tuft, pale yellow on the sides, black in centre.

Exp. wings, 15 m.m.

3 ♂ 2 ♀. On *Madaria elegans* Don. Saucelito, Calif. (H. E.)

Types. Coll. Hy. Edwards.

ÆGERIA ALBICORNIS. n. sp.

Bronze black. Antennæ with the apical third clear white. The pectus and joints of the tibiæ are also white.

Exp. wings, 18 m.m.

1 ♂. Nevada. (Morrison.)

Type. Coll. F. Tepper.

ÆGERIA PROXIMA. n. sp.

Allied to the last. Bronze black, but with the palpi, edges of coxæ, and the middle of caudal tuft, clear white. Tips of tarsi clear white. Underside of fore wings pale yellow. Fringes golden brown.

Exp. wings, 20 mm..

White Mts. N. H. (Morrison.)

Type. Coll. F. Tepper.

ÆGERIA INUSITATA. n. sp.

Greenish brown throughout. Wings with all the margins very narrow, giving the insect a most delicate appearance. Orbits of the eyes, palpi beneath, collar, edges of fore coxæ, joints of tibæ, and a narrow band on the fourth segment beneath, clear white. The lower side of abdomen has also a steel blue reflection.

Exp. wings, 24 m.m.

White Mts. N. H. (Morrison.) Andover, Mass. (F. G. Sanborn.)

Types. Coll. F. Tepper. Bost. Soc. Natural History.

ÆGERIA NICOTIANÆ. n. sp.

♂. Forewings bright golden purple, the latter color predominating along the costal margin. Vitreous space, almost linear, reaching nearly to the base of the wings, and closed posteriorly by the fiery red discal mark. Fringes of both wings, light golden brown. The under side of wings golden, the margin of the posterior pair the same color. Antennæ and head black, orbits of the eyes, clear white. Palpi golden yellow, darker above. All the legs pale golden yellow, the tibiæ banded with steel blue. Thorax with anterior and posterior margins golden yellow. Abdomen black, with narrow golden bands on second, fourth and seventh segments, the middle one being the broadest. Caudal tuft, black, golden yellow at the sides.

♀. Similar to the ♂, but a little larger, and the reddish discal mark more apparent.

Exp. wings, ♂ 11 m.m.; ♀ 14 m.m.

1 ♂. 1 ♀. Texas. (J. Boll.)

Types. Coll. B. Neumoegen.

PYRRHOTAENIA POLYGONI. n. sp.

All the wings opaque. Greenish black, with metallic reflection. Basal half of internal margin of forewings, the basal two-thirds of posterior pair, palpi, collar, sides of pectus, sides of thorax, fourth and seventh segments of abdomen, and the sides of abdominal segments bright fiery red. Caudal tuft red in the centre, greenish black at the sides and beneath. Fore femora fiery red, the rest greenish black. Tibiæ deep orange, black at the extremities. Tibial spurs, pale orange. Tarsi, greenish black.

Exp. wings, 18 m.m.

♂. San Miguel, Calif. (H. E.) On *Polygonum maritimum*. L.

Type. Coll. Hy. Edwards.

One of the most beautiful and striking species of the whole group.

PYRRHOTAENIA FRAGARIAE. n. sp.

♂. Forewings opaque. Costal half and posterior margin, pale golden green. Interior margin for about two-thirds of its distance, dark orange. Hind wings, vitreous in the centre, with the margins, and small discal spot, dark orange. Under side of wings, dark orange at base, golden brown on margin. Fringes, golden brown. Head, thorax and abdomen, greenish brown.

Palpi, collar, sides of thorax, sides of abdomen, broad band across sixth segment, and caudal tuft dark orange. Femora brown black. Tibiæ dark orange, black at their junction with the tarsi, which are orange, clouded with black.

♀. Similar to the ♂, but a little larger.

Exp. wings. ♂ 18 m.m. ♀ 21 m.m.

1 ♂ 1 ♀. Colorado. (Morrison.)

Types. Coll. Hy. Edwards.

PYRRHOTAENIA HELIANTHI. n. sp.

Differs from *P. fragariæ*, in having the forewings nearly wholly golden green, with the exception of a narrow stripe of dark orange, from base about half way along the internal margin. The vitreous space on lower wings is exceedingly small, the wing being almost covered with scales.

Exp. wings, 17 m.m.

1 ♂. 1 ♀. Virginia City, Nevada. (H. E.) On *Helianthus*, sp.

Types. Coll. Hy. Edwards.

Closely allied to the preceding, of which it may be an extreme variety.

PYRRHOTAENIA ACHILLAE. n. sp.

Golden green, with metallic reflection. Very narrow line on sides of thorax, and a narrow basal line along internal margin of forewings, orange red. Under side of palpi, sides of pectus, and under side of caudal tuft dull orange red. Fringes of both wings, head, and antennæ, dull black.

Exp. wings, 15 m.m.

1 ♂. San Rafael, Califor. (H. E.) On *Achillea millefolia. L.*

Type. Coll. Hy. Edwards.

PYRRHOTAENIA TEPPERI. n. sp.

Forewings bronzed black, a little purplish on posterior margin. Hind wings with costa pale orange. Fringes of both wings, purplish black. Beneath, both wings are orange at the base, with the vitreous space opalescent. Antennæ and front of head, dull black. Crown of head, whole of thorax, two basal segments of abdomen, under side of abdomen, caudal tuft, palpi, pectus, and coxæ bright deep orange. Tibiæ pale orange within, purplish black without. Tarsi purplish black, mottled with orange.

Exp. wings, 23 m.m.

1 ♂. Georgia, (Morrison.)

Type. Coll. F. Tepper. to whom I regardfully dedicate this exquisite species.

PYRRHOTAENIA EREMOCARPI. n. sp.

Steel blue. Base of forewings, narrow stripe on sides of thorax, palpi beneath, and sides of pectus, fiery red. Caudal tuft also fiery red, with the sides steel blue. Fringes, golden brown.

Exp. wings, 20 m.m.

1 ♂. Sier. Nevada, Calif. (T. L. Mead.)

Type. Coll. Hy. Edwards.

PYRRHOTAENIA MEADII. n. sp.

Greenish black, with metallic reflection. Base of forewings half way along internal margin, base of hind wings half way along abdominal margin, and the basal half of both wings beneath, fiery red. Palpi beneath, sides of pectus, fourth, sixth, seventh abdominal segments, middle and under side of caudal tuft, also bright fiery red. Femora and tarsi greenish black. Tibiæ dark orange, greenish black at both the extremities.

Exp. wings, 20 m.m.

3 ♂. Lake Tahoe, Califor. (T. L. Mead.)

Types. Coll. Hy. Edwards.

Two of these examples have a much more greenish hue than the other, and one of them has a small vitreous dash on the fore-wings. I do not, however, regard them as specifically distinct. I have dedicated the species to my friend, Mr. Mead, who has so frequently added rare species to my collection.

PYRRHOTAENIA ORTHOCARPI. n. sp.

Nearly allied to *P. Meadii.* The forewings, however, are rather pale sage-green, reddish orange at their base, and for half way along the internal margin. The linear space vitreous before the cell in *P. Meadii* is here filled in with shining silvery scales, as is also the small space behind the cell. Held opposite to the light, these spaces appear to be transparent, but viewed obliquely they are quite opaque. The hind wings have their base, and about one-half their abdominal margin stained with reddish orange, the rest of the margin, golden brown. Antennæ black, palpi dark orange, with the terminal joint, black. Fore femora dusky orange. Middle and hind femora, and fore tibiæ and tarsi dusky. Middle and hind tibiæ and tarsi orange, the former banded with black at the base of the spurs. Thorax and abdomen golden green, the former with the sides reddish orange. The abdomen has the fifth and anal segments broadly reddish orange above, the whole of the segments beneath being bordered posteriorly with the same color. Caudal tuft, reddish orange, greenish black at the sides.

Exp. wings, 20 m.m.

3 ♂. 1 ♀. On *Orthocarpus luteus.* Nutt. Washoe Lake, Nevada, (H. E.)

Types Coll. Hy. Edwards.

PYRRHOTAENIA TEXANA. n. sp.

Fore wings dark bronze-green, yellowish at base, along internal margin, and with a sub-linear vitreous space not reaching to the base of the wing. Discal mark black. Beyond this an orange patch, composed of three streaks, following the course of nervules. Margins of hind wings, purplish black. Beneath, the marks of the upper side are repeated, except that the base of the forewings is a little more orange-yellow. Antennæ and head black. Palpi and collar bright orange. Fore femora and tibiæ black, edged with orange. Hind tibiæ, bright bluish black, orange at the joints. Hind tarsi, black above, orange below. Abdomen with second, fourth and seventh segments, bordered posteriorly with fiery red. Beneath, the three anal segments are banded with orange red. Caudal tuft, greenish black.

Exp. wings, 20 m.m.

2 ♀. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

ZENODOXUS HEUCHERÆ. n. sp.

♀. Wings all golden bronze, blackish at their base, and with some golden scales in centre of anterior pair. Beneath they are golden yellow. Palpi pale yellow, terminal joint black. Head and thorax golden brown, collar pale yellow. Abdomen with second, fourth, sixth and seventh segments very broadly pale yellow, the intermediate segments sparsely covered with yellow hairs. Under side of abdomen blackish. Caudal tuft brownish black. Femora blackish. Tibiæ and tarsi alternately ringed with black and pale yellow.

♂. Smaller than the ♀, with the abdominal rings a little narrower.

Exp. wings, ♂ 13 m.m. ♀ 18 m.m.

6 ♂ 2 ♀. H. E. On flowers of *Heuchera rubescens* Torr. Lake Tahoe, Calif.

ZENODOXUS POTENTILLÆ. n. sp.

In this form the wings are wholly bronze brown, darker than in the preceding species, with a fiery red reflection, and beneath the basal two-thirds of wing is wholly fiery red. Antennæ dark yellow. Tibiæ and tarsi are fiery red, banded with black. The bands on the abdomen are a little darker yellow, but in other respects it resembles the previous species.

Exp. wings, 18 m.m.

1 ♂. 2 ♀. Lake Tahoe, Cal. San Rafael, Cal. (H. E.) With *Z. heucheræ*.

Type. Coll. Hy. Edwards.

ZENODOXUS CANESCENS. n. sp.

The general color of this very curious species is heavy gray. The fore wings are quite opaque, ash grey, flecked with a few black scales. Hind wings vitreous in their central portion, narrowly opaque along costal and abdominal margins, ash grey. Under side of wings same as above, with a few black dashes in centre of primaries. Antennæ, palpi, thorax, abdomen and legs wholly ash grey, with a few black speckles irregularly placed.

Exp. wings, 21 m.m.

2 ♀. Colorado. (C. V. Riley.)

NORTH AMERICAN SPECIES OF ÆGERIDÆ DESCRIBED BY FRANCIS WALKER, F.L.S. EXTRACTED FROM CATAL. LEPID. HETEROCERA, B. MUSEUM. PT. 8.

" ÆGERIA PLECIÆFORMIS.

"*Male.* Black. Head with whitish hairs behind. Palpi pale yellow, somewhat shorter than those of S. Æstriforme. Antennæ bluish black, slightly pectinated. Thorax with a yellow stripe on each side. Hind borders of the abdominal segments yellow. Legs luteous; femora black; tibiæ with black stripes. Wings limpid. Fore wings purplish black along the costa and at the tips, and with the usual band of the same hue. Length of the body 5 lines, of the wings 10 lines.

" Nova Scotia. From Lieut. Redman's collection.

" ÆGERIA PYRAMIDALIS. *Barnston, M. S. S.*

"*Male.* Black. Head with yellow hairs about the eyes. Palpi yellow beneath; third joint elongate-conical, much less than half the length of the second. Antennæ rather stout, almost filiform, slightly pectinated, ferruginous beneath, very much longer than the thorax. Thorax with two yellow spots on each side, one at the base of the fore wing and one in front. Abdominal segments with yellow bands, which are broadest and most distinct beneath. Legs with whitish stripes. Wings limpid, with blackish cupreous ciliæ. Fore wings blackish cupreous along the costa and at the tips, and with a blackish cupreous band, which is slightly bordered with red; a red line along the hind border. Length of the body, 5½–6 lines; of the wings, 9–10 lines.

"St. Martin's Falls, Albany River, Hudson's Bay. Dr. Barnston."

" ÆGERIA ODYNERIPENNIS.

"*Female.* Dark brown, slightly cupreous. Head whitish about the eyes. Palpi yellow, obliquely ascending, not long. Antennæ bluish black, simple, subfiliform, rather stout, very little longer than the thorax. Thorax with three yellow spots on each side. Abdomen with a yellow band on the hind border of each segment. Legs yellow; femora striped with brown. Wings limpid, with cupreous ciliæ Fore wings cupreous along the costa and at the tips, and with the usual band of the same hue. Length of the body, 5½–6½ lines; of the wings, 11–13 lines.

"Nova Scotia. 4 examp. E. Doubleday and Lieut. Redman."

" ÆGERIA EMPHYTIFORMIS.

"*Male.* Purplish black. Head with white hairs in front. Palpi thickly clothed beneath with rather long brown and tawny hairs. Antennæ ferruginous. Thorax with a yellow band in front and with a yellow spot at the base of each fore wing, and one at the tip of the scutellum. Abdomen with a yellow band on each segment; apical tuft black, with a few yellow hairs.

Legs red, partly yellow; femora black; tibiæ with black stripes. Wings purplish cupreous. Fore wings yellow and partly red in the disk, which is interrupted by the usual band. Hind wings slightly streaked with red, limpid toward the base. Length of the body, 5 lines; of the wings, 10 lines. *Female.* Head yellow in front and along the hind border. Palpi yellow, clothed beneath with reddish hairs. Antennæ red, blackish toward the tips. Apical tuft of the abdomen luteous, with a few black hairs on each side. Tibiæ wholly red. Fore wings with red disks. Hind wings mostly red along the borders.

" In this species and in *Æ. Odyneripennis* the antennæ of the male are more deeply pectinated than in the European species of the group *Bembecia.*

" United States. E. Doubleday."

" ÆGERIA HYLOTOMIFORMIS.

" *Female.* Dark ferruginous. Head with yellowish white hairs behind and in front, and about the eyes. Palpi pale yellow. Antennæ blackish at the tips. Thorax with a pale yellow tuft at the base of each wing. Abdomen with a testaceous band on each segment. Legs brown; fore coxæ testaceous beneath; tibiæ with a testaceous band; spurs and tarsi testaceous. Wings limpid, with purplish cupreous ciliæ. Fore wings with the borders and the usual band of the same hue. Hind wings with a purplish cupreous streak across the tip of the discal areolet, which character distinguishes this species from *Æ. Odyneriformis.* Length of the body, 6 lines; of the wings, 12 lines.

" Nova Scotia. Lieut. Redman."

" ÆGERIA PYRALIDIFORMIS.

" *Female.* Cupreous brown. Head with yellow hairs about the eyes. Palpi yellow, slender. Antennæ slender, subclavate, very much longer than the thorax. Pectus with a yellow stripe on each side. Abdomen with a yellow band at the middle of its length. Hind tibiæ mostly yellow; hind tarsi whitish. Fore wings cupreous brown, with a yellowish basal streak on the under side. Hind wings limpid, with cupreous brown ciliæ. Length of the body, 4 lines; of the wings, 8 lines.

" United States. E. Doubleday."

" ÆGERIA SAPYGÆFORMIS. (Group Conopia.)

" *Male.* Bluish black. Head with red hairs behind. Palpi red, black above toward the base. Antennæ serrated and pubescent beneath, very much shorter than those of the European Conopiæ. Abdomen with a slight red band at the base; segments from the fifth to the eighth red; apical tuft blue. Anterior tibiæ tawny; hind tibiæ with red tips; tarsi mostly testaceous. Wings with cupreous ciliæ. Fore wings blue, purple toward the tips, with a red discal streak, behind which there is a limpid streak. Hind wings limpid. Length of the body, 4 lines; of the wings, 8 lines.

"This species differs much from the typical form of Conopia, and somewhat approaches Pyropteron.

"United States. E. Doubleday."

"ÆGERIA GELIFORMIS.

"*Male.* Black. Head white on each side in front. Palpi almost bare; third joint lanceolate, rather less than half the length of the second. Antennæ bluish black, simple, ferruginous beneath and slightly thicker toward the tips, about twice the length of the thorax. Abdomen red, black at the base; apical tuft bluish black, red toward the base. Fore wings bluish black. Hind wings limpid, with blackish tips and hind borders. Length of the body, 3 lines; of the wings, 6 lines.

"United States. E. Doubleday."

Note. The species here inserted from Walker's descriptions will appear in the monograph in their proper position.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] December, 1881. [No. 11.

ON CERTAIN HABITS OF HELICONIA CHARITONIA, LINN., A SPECIES OF BUTTERFLY FOUND IN FLORIDA.

By W. H. Edwards.

In part read before the Ent. Sub-Section of the Am. Assn., at Cinn., August 18, 1881.

In Wallace's Contributions to the Theory of Natural Selection, London, 1870, page 77, we read: "There is in South America an extensive family of these insects, the Heliconidæ, which are in many respects remarkable. They are so abundant and characteristic in all the woody portions of the American tropics, that in almost every locality they will be seen more frequently than other butterflies. They are exceedingly beautiful and varied in their colors, spots and patches of yellow, red, or pure white, upon a black, blue or brown ground being most general.

They frequent the forests chiefly, and all fly slowly and weakly. Yet, although they are all so conspicuous and could certainly be caught by insectivorous birds more easily than almost any other insect, their great abundance all over the wide region they inhabit shows that they are not persecuted.

It is to be especially remarked also that they possess no adaptive coloring to protect them during repose, for the under side of their wings presents the same, or at least, an equally conspicuous coloring as the upper side, and they may be observed after sunset suspended at the ends of twigs and leaves, where they have taken up their station for the night, fully exposed to the attacks of enemies, if they have any.

These beautiful insects possess, however, a strong, pungent, semi-aromatic or medicinal odor, which seems to pervade all the juices of their system. When the entomologist squeezes the breast of one of them between his fingers to kill it, a yellow liquid exudes, which stains the skin, and the smell of which can only be got rid of by time and repeated washings. Here we have, probably, the cause of their immunity from attack, since there is a great deal of evidence to show that certain insects are so disgusting to birds that they will under no circumstances touch them."

Mr. Belt, in "Naturalist in Nicaragua," p. 316, relates, that when in Brazil he watched a pair of birds catching butterflies and dragon flies, which they brought to their nest to feed their young, and in no case did they catch one of the Heliconidæ, which were in great numbers about, and could have been caught with less trouble than any others. Also, that a tame monkey, who was extremely fond of insects, and would greedily munch up any beetle or butterfly given to him, never would eat a Heliconian. There was no doubt from his actions that they were distasteful to him.

H. *Charitonia* is common in parts of southern Florida, and I am in possession of facts as to its habits through a correspondent, Dr. Wm. Wittfeld, a physician, resident at Georgiana, Indian River.

The eggs are laid on the tenderest terminal leaves of passion-vine. The caterpillars are conspicuous in color, being in the middle stages greenish white, and in the last stage dead white, like porcelain. They are furnished with long black spines, on the vertices of head as well as on body.

The chrysalis is a singular and remarkably pretty object. From the top of the head case proceed two long foliaceous divergent processes, and on the dorsal side of abdomen are broad and thin processes tipped with sharp thorns. The color is brown in shades, with some yellowish, and with burnished gold spots.

The butterflies live in the forest and fly along the paths, but they come into the open in the heat of the morning and return towards night, finding roosting places on Spanish moss and on dead twigs or branches, especially such as have dry leaves still hanging. Here they collect up to the number of seventy or even more.

The caterpillars, after third moult, at which time they become quite conspicuous in color, conceal themselves during the day.

Nothing appears to have been published of the preparatory stages of *Charitonia*, although it is a common species in Mexico, Central America, and some of the West India Islands. I deem myself fortunate, therefore, in having secured drawings of every stage for a plate in the "Butterflies of N. A." I have received young caterpillars, at Coalburgh, sent through the mails by my friend, and have raised them to chrysalis and imago.

Dr. Wittfeld, some time ago, called my attention to a strange habit of these butterflies, as follows: "On May 28th, I observed three *Charitonias* on a chrysalis of same species in the woods. They were firmly attached, and on trying to drive them off they would not go. I tried repeatedly, and finally used force. But after flying around a few times they took up their former position, heads down.

The next day the same thing occurred, only I noticed that one butterfly at a time would leave to feed; force was again used, with the same result as before. The following day, shortly after dawn, only a trifle of empty shell remained.

This observation prompted me to raise another chrysalis, which I suspended in a flowering shrub, which *Charitonia* frequented, June 27. Soon some butterflies came and touched the chrysalis, but its wriggling seemed to cause them to move off. Two days before the imago was due, they attached themselves again, two or three at a time, and would only yield to force, always returning. On the third day, at daybreak, only a trifling bit of the empty shell was left, and the butterflies were all gone." Dr. Wittfeld adds, "Did they come to protect the chrysalis or to assist the butterfly to come forth, or was there anything of sexual desire?"

I replied to this, asking how the butterflies attached themselves. Did they actually rest on the chrysalis, holding on by the legs? Also, was I to understand by bits of empty shells remaining that the imagos had come from the two chrysalids? I suggested, if this last was not what he meant, that, perhaps, the butterflies had discovered that the chrysalids were dead and decaying and came to seek the fluids as they come to carrion.

On this Dr. Wittfeld again writes: "In each case the butterfly emerged from the chrysalis. The chrysalis looked natural but was growing darker, and the day before the emerging, the coming live insect could, to some extent, be distinguished. There was nothing dead or decayed or partly eaten about it. All the legs of the guarding butterflies had firm hold of the chrysalis, and it required a little effort to remove them with the fingers. They sat firmly, not lightly upon it. To frighten them off did no good, it required force to remove them. After having been picked off they did not stay long away, but flying around a few times, (I having removed to some distance), returned to the chrysalis and attached themselves to it just as they had done before."

This is explicit. May there not be here a case of intelligent protection of the unborn butterfly by other individuals of its species? The butterflies themselves are protected, as we read, by their obnoxious smell and taste, or both, from birds, lizards and other animals, and the chrysalis might be just as obnoxious after it was seized. But its color or appearance would not be sufficiently well known for its protection, and at the time when it was least able to take care of itself. To be sure, the chrysalis may, in a measure, protect itself by wriggling about, and by the squeaking noise which we read in books the chrysalids of the Heliconidæ make when alarmed, and which Dr. Wittfeld informs me he had noticed in the case of *Charitonia*. But when the pupa-case was softening, and the immature imago was in condition to receive injury by any rough attack, apparently the friendly neighbors gather about it and cover it unceasingly till the danger is past, and the butterfly emerges.

The foregoing recital led to some discussion by members of the sub-section, and it seemed to be rather the prevailing opinion that the immediate cause of the gathering of the butterflies about and on the chrysalis must be sexual. Much was said about the attraction of males of the Saturnidæ by the females, but this is excited by the females at large, not encased in pupa. It was doubted by some members if any odor could emanate from the imago of a moth in pupa, or of a butterfly in chrysalis, hermetically sealed up, as it were. Further observations were desirable.

After returning home from Cincinnati, I wrote Dr. Wittfeld, urging him to try again, and especially to ascertain whether the free butterflies and the imago in the chrysalis were always of opposite sexes or not, and whether females were attracted to a chrysalis in any case. I have his further report, as follows;

"With regard to the chrysalis found May 28, of which I wrote you, I add, that there was found by me on the ground, on the morning the butterfly emerged, a female with wings but partly expanded, yet paired with a perfect male. Also, when I discovered that the butterfly had come from the second chrysalis, that of June 27, I found a similarly undeveloped female on the ground near by, paired with a free male. I lifted both and placed them on a twig. The male flew off in course of two hours, but the female remained, though a cripple and unable to move.*

"After receiving your letter, for a long time I could obtain neither eggs nor caterpillars of *Charitonia*, but at last, near the end of September, I hung out a chrysalis. A heavy rain storm setting in, no butterflies were flying that evening, and next day, six A. M., I found the empty shell of the chrysalis and imago. On Oct 1, I suspended another chrysalis. Soon a number of of butterflies appeared, flying around and touching it. None however attached themselves to it as in previous observations. I caught one after another of these butterflies, as they came, and put them in a bag. About eleven o'clock, the imago came from the chrysalis, and as it clung to the empty shell, an occasional free butterfly would alight by it or fly about it. On examination this imago proved to be a male, and so did the captured butterflies.

At the same time another chrysalis was suspended, and began to change color, October 4, early in the afternoon. Soon male butterflies appeared, took hold of the chrysalis, as before, but were easily frightened away.

---

* As Dr. Wittfeld had not mentioned these facts in his first accounts, I conclude that he did not then understand the relation between these crippled females and the imagos in the chrysalids, as he afterward learned to.

By six o'clock, same afternoon, the color had changed, and males came freely, attached themselves firmly, and would not let go, in fact, were utterly regardless of their safety. When picked off they would fly around and return at once. Two males remained all night. Before daybreak next morning, I was at my post, and there found the two males, opposite one another, head down, abdomen curved toward the abdominal end of the chrysalis, both apparently exercising a pressure. Lighted matches held near them would not drive them off, shaking the twig did not loosen their hold, only picking them off bodily separated them from the chrysalis. The latter was now almost black, and momentarily I expected the shell to burst. This happened, but the break was not at the usual place. Owing probably to the pressure or weight of the butterflies the shell burst at the abdominal end, and *instantly one of the males made connection with the female imago, while the head and thorax of the latter were still enclosed in the shell.* After about ten minutes, I determined to free the new insect, which was accomplished by a slight pressure on the shell, and I then removed the pair and suspended them to a leaf-stem. The wings of the female immediately began to expand, but they did not fully develop. Without my aid, the imago would not have been able to extricate itself from the shell, although copulation had been affected.

I suspended another chrysalis, well discolored, under same conditions, October 7, in the morning. Males flocked around the chrysalis, circled about a few times, approached closely and then flew off again, none having alighted or actually touched the chrysalis. This went on for an hour, when a male emerged. The butterflies were mostly caught and all proved to be males.

October 17, another chrysalis was suspended under same conditions as the last mentioned. Males appeared, etc. Behavior just as before; none touching. The imago proved to be a male.

It seems to me that the sexual odor is but faintly developed when first discoloration takes place, and hence the chrysalis draws the males but little, but as the color changes the odor developes rapidly, so that males flock to the chrysalis from different directions."

On November 1, Dr. Wittfeld again writes, "To-day I made another corroborative observation on Heliconia chrysalis. At eight A. M., 2 ♂♂ attached themselves to female chrysalis, and acted as before reported. Four more males had appeared by nine o'clock, took hold as best they could, and the six made quite a bunch. Soon after others came, but had to be content with flying in close proximity, as there was no more holding room. At ten o'clock, I freed the female from the crowd, and found the abdomen exposed, but head and thorax still in the shell. I observed that the abdomen was torn so that the contents were somewhat protruding.[*] I carried her to the house, allowed her to suspend from a branch, and being now out of the shell, the wings soon grew, and in another hour or so, the wound was healed or dried, and the insect flew off.

Though I have seen many Agraulis *Vanillæ* copulating, I don't remember of ever having seen H. *Charitonia* do the same at large. This prompts me to propose the following question; does this species ever pair in the ordinary way, after both sexes are fully developed, or do the males hunt the females while still in chrysalis? My late observations have brought me into all sorts of places, chiefly where passion-vine runs over dense bushes. There I have made frequent captures and have found all taken to be males. I believe the males were in search of a chrysalis. The females are mostly flying where the leafy parts of the vine are, while the males are where the chrysalis would be likely to be found, some distance off or below."

Dr. Wittfeld's admirable observations settle this; that in H. *Charitonia* the males are able, by some means, to distinguish the presence of a female in chrysalis, from the time when discoloration of the shell commences, that the attraction becomes stronger as the imago nears its emergence, that the females show no such attraction toward a male in chrysalis, and that males do not attract males. Incidentally, the female chrysalids would seem to be thoroughly protected against birds and other animals, but the protection, apparently, is purchased at a dear rate, if the female insect is liable to bodily injury or to be left crippled in wing. The last question propounded by Dr. Wittfeld, no doubt, he will in time be able to answer.

As I have elsewhere stated (Can. Ent. xiii, p. 208) it is not unusual to find female butterflies so lately out of chrysalis that the wings are at least limp, coupled with perfectly developed males, but I have not myself observed a case where the connection took place the instant the female broke from its shell, or before the wings were expanded. Certainly I have never known of male butterflies watching the advent of a female one moment, much more, for hours and days, and do not remember ever to have read of such an occurrence.[†]

November 11, 1881, discovered two chrysalids of *Charitonia* on the same plant, about two inches apart, but as much as two feet from the nearest passion vine. No. 1 was not discolored, No. 2 was a little discolored. To each chrysalis two males were attached. They would let go when touched, those on No. 2 hesitating a little; however, they all would return at once. On both chrysalids I noticed that the bodies of the males were bent up, that is, off from the chrysalis, and the pressure excited in former observations was not yet applied by the males. Apparently the males simply kept hold so as to be on hand when things developed.

---

[*] I take it that copulation had been effected and that the torn appearance was caused by the forcible removal of the male. W. H. E.

[†] NOTE—After the foregoing pages were sent to the printer, I received from Dr. Wittfeld a statement of further observation, as follows:

Nov. 12, No. 1 is forsaken. To No. 2 four or five males cling, head down, bodies still bent up. They leave only to feed.

Nov. 13, No. 1 still forsaken, but in course of the day males flocked to it, their bodies still bent up. Were frightened away readily.

Nov. 14, No. 1 had all the attention of the males, while No. 2 remained forsaken, the bodies now touching the chrysalis, but almost midway of the abdomen of the pupa, not at the extremity.

Later. Two males had taken firm hold, as in previous observations, touching at the end of abdomen of pupa; would not let go, but had to be picked off.

Later. I found a pair in copulation on the ground. Now I examined No. 2 and found the imago nearly developed, but dead, and this explains why the chrysalis was forsaken.

During this observation I noticed that the males would alight on the chrysalis as they do on flowers, then wheel around quickly, head down, body up.

Nov. 14. My attention was attracted by a flock of six or eight *Charitonia* butterflies on the edge of woods, flying around an object which, on inspection, I found to be a chrysalis.

SOME REMARKS UPON THE CATOCALÆ, IN REPLY TO MR. A. R. GROTE.

By Geo. D. Hulst.

I notice in No. 9, Vol. I. of "PAPILIO," some strictures by Mr. A. R. Grote upon myself and an article written by me upon the Catocalæ of the U. S., and published by me in the Bulletin of the Brooklyn Ento. Soc., Nos. 1 and 2, Vol. III.

Following Mr. Grote in his remarks upon the article, I reply as follows:

It is substantially charged that in the article I was but the mouthpiece of Mr. Strecker; that he was the author or inspiration of the determinations made. I am able to prove by Mr. Strecker's letters to me at the time that he was not the suggester or inspirer of the article, nor the author of its ideas; and, moreover, that in one way or another he did not agree with me in my determination concerning the following Catocalæ: *Belfragiana, Alabamæ, praeclara, Atarah, abreviatella, Whitneyi, illecta, Bunkeri, Snowiana, perplexa, Meskei, vidua, Sappho, residua, Angusi and Mariana*—16 in all. He consequently did not so nearly agree with me as did Mr. Grote.

In giving my judgment upon the names in dispute between Messrs. Strecker and Grote, I decided upon the following evidence. While these gentlemen are principals in interest in this matter, they are not principals in evidence. Priority in names is based upon priority of publication. I accepted against Mr. Strecker, Mr. Grote's admission that Part XI. of Mr. Strecker's work was distributed Nov. 10, 1874. Had there been any necessity I would have demanded evidence from the publisher Mr. Strecker employed. Mr. Grote's descriptions were published by the American Ento. Soc., of Philadelphia, through Mr. Chas. A. Blake, its curator. Mr. Strecker, hearing I was about to publish the catalogue, wrote me a long article founded on letters received by him at the time from Mr. Blake, showing from these letters that Mr. Grote's names were not published in any way before Nov. 10. I told him, by letter, I would not receive that as evidence, unless Mr. Blake gave it his personal endorsement, and thus, as the agent of the Society, gave its declaration as to the time of publication. The papers were taken to Mr. Blake, and he, on the back of Mr. Strecker's argument, wrote as follows: "After going over all the data and correspondence between Mr. Strecker and myself, and carefully comparing dates from my own postal cards and letters to him in regard to the time proofs were sent to him (Mr. Strecker), it appears that Mr. Grote could not have received his "author's proofs" of his paper bearing date September, 1874, till after November 10, 1874, as there was no final corrected proof issued on that date yet. The matter on the other side of this, I find after going over carefully with the data at hand, is perfectly correct, so that if you want to use the name of Strecker after the species of Catocalæ in dispute, do so.

CHAS. A. BLAKE."

After my article was published, Mr. Hy. Edwards found some letters written him by Mr. Strecker at the time, which showed that Mr. Strecker's descriptions were not as yet written early in October, 1874. Of the existence of the letters neither Mr. Grote nor myself knew at the date of my publication. But from them it becomes certain that Mr. Strecker ante-dated Part XI of his work; and the two gentlemen in Brooklyn who told me they saw his proof sheets in August, were mistaken. These gentlemen are persons whose word any one would have taken without dissent. I told Mr. Grote I would publish the fact of Mr. Strecker's ante-dating, but he demanded that with that I should say the species were his, which, of course, I could not. I offered to publish the fact in the *Bulletin* of the Brooklyn Ento. Soc.; but as the fact did not affect the priority, the editor refused to allow it as it might tend to create confusion. Mr. Grote undoubtedly had his names first in MSS. Mr. Strecker undoubtedly had his first published. The date—September, 1874—on Mr. Grote's paper is the time it was received by the American Ento. Soc., and perhaps went to the printer—but the printer was slow, and Mr. Strecker got ahead in the race. When Mr. Hy. Edwards, acting as the advocate of Mr. Grote, came with his letters to a meeting of the Brooklyn Ento. Soc, (this was after my catalogue was printed) to show me how unfounded was Mr. Strecker's claim, I showed him my evidence, which astonished him. I asked him whether with the evidence I could have decided otherwise, and he answered, emphatically, "No." I am aware Mr. Edwards yet gives the names to Mr. Grote, but he does it on the basis that probably Mr. Grote's proof sheets were first run off, and anything printed, though uncorrected and undistributed, is publication. I do not look at publication in that light, and decide otherwise.

I do not prefer the name *Amestris* to the name *Anna*. Any one looking in Staudinger's Catalogue at the names of the Catocalæ of the European fauna, and over a catalogue of the names of our own species, will see that the names run almost universally in certain lines. "*Levettei*," though from the name of a gentleman of worth and ability, is not in either of those lines of names. And that name is the only one I referred to when I said Mr. Grote's names were not all Catocaline, as Mr. Grote knew when he wrote. Furthermore, *Amestris* was not named in honor of Swinburne's heroine, any more than Mr. Grote's *Anna* was named in honor of the prophetess of that name.

Concerning the position and specific worth of many so-called species, each student has a right to his own opinion. I followed in the catalogue the definitions laid down by me in the introduction, and in so doing followed Drs. Le Conte and Horn in the Coleoptera, Dr. Staudinger, in his catalogue of the European fauna, and Dr. Packard in his Geometrid Moths of N. A. And, while in some respects my opinion has changed, in the main I see no reason to doubt the substantial correctness of my catalogue.

Mr. Grote says, "it was a happy stroke and worthy of the disciple of Mr. Strecker to refer *semirelicta* as a var. of *unijuga* and remove *pura* to some distance as a distinct species." If Mr. Grote will refer to the catalogue he will see *semirelicta* is a var. of *Briseis*, not of *unijuga*. In the determination of *semirelicta* I had the advantage of both the literature and type of the species and am not in the minority in my judgment of its specific value. I put *Beaniana* where, from the "literature on the subject," I thought it ought to belong, and *pura* is next. If *Beaniana* is not in its proper place, *pura* certainly is, unless, as I think now, it ought to be put before *Briseis* rather than after.

Cælebs is a good species. Mr. Strecker was responsible for the catalogue determination as was stated in the catalogue, and it is the only thing for which he was responsible. It is true, however, he still says, that he was misled by dark specimens of *Badia* identified by Mr. Grote as *Cælebs*. Mr. Grote, if such gross lack of appreciation be allowed me, is not absolutely beyond such mistakes. He once upon a time identified many of the Heterocera for me, receiving therefor my written and substantial thanks. Among the insects sent were two Catacolæ. One a typical specimen of *Aspasia*, the other the type of *pura*, a description of which was already written. I desired thus to get Mr. Grote's unprejudiced opinion, and learn whether the former was his *Arizonæ*, and the latter his *semirelicta*. Mr. Grote actually sent the former back labelled "*Walshii*," and the latter "*Faustina*." Is it possible he had never "studied the literature upon the subject? Is it possible he did not know he had written a description of *Arizonæ*, to which he could refer? Is it possible that he did not know Mr. Strecker had written a description of *Faustina*, and had given a colored figure of it so excellent that the merest beginner could have known *pura* was not *Faustina*? Is it possible that he did not know he had the type of *semirelicta* in his cabinet, and was he ignorant of the "literature upon that subject" also? These facts throw some "light" upon Mr. Grote's claim that Mr. Strecker's *Aspasia* is his *Arizonæ* and that my *pura* is his *semirelicta*.

It is said I turned the sequence of the species upside down. I did, and gave as a reason for it that the yellow under winged species seem to follow more naturally after *Leucanitis* and *Parthenos*, and the dark under winged species glide more naturally into *Spintherops*. Can any one give a reason for the contrary arrangement except that Dr. Morris began it?

Mr. Grote's article and argument are largely made up of personalities. Upon these I have nothing to say. American lepidopterology has been disgraced in the eyes of the world, in the past, by such things. I will not be a willing party to the continuance of the disgrace. It is something for thought that my friend, Mr. Grote, has almost without exception had a part in all personal disputes, and has generally been plaintiff in those in which he has had part. It is certainly time the method was abated.

NOTE BY THE PUBLICATION COMMITTEE.

It is a subject of great regret to us that anything like personalities should have crept into the columns of "Papilio," but Mr. Grote's article having been printed during the absence of the editor from this city, it appeared to be only "fair play" to allow Mr. Hulst the opportunity of reply. As far as this journal is concerned, the matter will end here, and no further personal remarks will again be permitted in its pages.

A NEW VARIETY OF CATOCALA.

By G. H. French, Carbondale, Ill.

Catocala Robinsoni. *Grote.*
Var. *Curvata*. n. var.

In this form the ground color is a little brighter gray and the markings are a little more distinct than in the usual form. The distinctive features are a prominent black basal dash extending from the base of the primaries beyond the t. a. line, and a curved shade of the same from the costa at the place of the beginning of the median shade to the outer margin below the apex. I have several specimens of *Robinsoni* in which there is a faint trace of the subapical curve, but only a trace, and no others with even a trace of the basal dash. Expanse 1.35 inches.

Described from one ♀ taken here.

NOTES ON "THE TORTRICIDÆ, TINEIDÆ AND PTEROPHORIDÆ OF SOUTH AFRICA, LORD WALSINGHAM, M.A., F.Z.S.," &C.

BY C. H. FERNALD.

The above is the title of an interesting paper by Lord Walsingham on some of the microlepidoptera of South Africa, published in the Transactions of the Entomological Society, 1881, Part II., with four uncolored plates.

I do not feel competent to review this valuable paper, since most of the species are entirely unknown to me, but I wish to express the opinion that his Lordship has done a most praiseworthy work in clearing up the synonymy of the various writers on the micros of South Africa.

Lord W. found a single female in this collection, which agreed with the description of *Eccopsis Wahlbergiana* Zell., the types of which are in the museum at Stockholm. The genus *Eccopsis* was established by Prof. Zeller in 1852, for the reception of this species. In 1859, Lederer, in his classification of the *Tortricidæ* of Europe put the well known European species *latifasciana* Haw., into the genus *Eccopsis*, and this had been followed by later German writers down to the year 1875, when Zeller published his work on the *Tortricidæ* of North America, in which he expresses a doubt whether *latifasciana* is congeneric with his *Wahlbergiana*. Clemens had previously (1860) established his genus *Exartema* for *nitidana* and several other species, but in 1865 he suppressed this genus and put the species at first placed in it, in the genus *Sericoris*. Zeller, in the paper above referred to, revived the genus *Exartema* of Clemens and restored the species formerly placed in it, with some which he described as new. Zeller's original description of the genus *Eccopsis*, while agreeing with *Exartema* in general, did not mention the remarkable appendage near the anal angle of the hind wing of the male, and he did not think it possible that he could have overlooked it when he was characterizing his genus *Eccopsis* if it had really been present. Lord Walsingham has taken the trouble to determine the fact that such an appendage exists, and publishes a sketch of the hind wing of *E. Wahlbergiana*, made by Mr. C. Aurivillius, assistant in the Entomological Department of the State Museum at Stockholm, where the types are preserved. This sketch shows the venation and the characteristic appendage at the anal angle of the hind wing. The form of the anal angle beyond the appendage is subject to some variation among the American species, but the sketch of *Wahlbergiana* agrees very closely with *Eccopsis Footiana*, and differs but little from *nitidana*, the type of Clemens' genus *Exartema*.

From the North American species now before me I am sure we cannot regard a certain amount of variation in the form of the wing, of generic value. I believe then that we are justified in regarding Clemens' genus *Exartema* equivalent to *Eccopsis* of Zeller, and our species should be referred to the latter genus.

NOTES ON SOME NORTH AMERICAN LEPIDOPTERA.

By Arthur G. Butler, British Museum.

GEOMETRITES.

It appears to me that no group of moths has got into greater confusion than the *Geometrites*, and I strongly suspect that the principal cause must be sought for in in the want of definition in this part of the work undertaken by M. Guenée; whether that eminent Lepidopterist was in a hurry to get through his work, or whether the publisher worried him, I do not care to inquire, but he certainly failed to distinguish between reliable and variable characters; and, worse than that, he failed to separate the species before him into natural groups; by this I mean to say that having characterized a genus as possessing primaries with the outer margin angulated, M. Guenée was as likely as not to place in it half a dozen species not possessing that character; whereas, according to description, he ought to have placed them in a succeeding genus.

As this uncertainty in the outline of species primarily referred to a genus has led to different authors forming entirely dissimilar views in accordance with the named types in their collections, the evil has naturally increased tenfold since the publication of M. Guenée's work, and the consequence has been a great multiplication of synonyms.

The following Geometrites have been sent to us by Mr. H. Edwards:

ENNOMIDÆ.

EUTRAPELA FALCATA. *Packard.*

Two examples exhibiting different color variation from the Sierra Nevada. The genus is confounded with *Chærodes*, *C. transferens* of Walker being the same as *E. clemataria*, a blunder due to the vague description,—"*les premières à apex aign et à bord terminal droit ou coudé en angle sur la* 2," a door being thus opened for the introduction by M. Guenée and all subsequent authors, of species utterly unlike in outline of wing.

OPISTHOGRAPTIS SULPHURARIA. *Packard.*

Two examples from California: it comes near to nothing in the museum series.

"ENDROPIA MADUSARIA. *Walker.*"

The species sent under this name seems to me to be the *E. effectaria* of Packard's Monograph; it certainly is not Walker's species (which seems to me to be the same as that figured by Packard), but comes nearer to *E. pectinaria*, *tigrinaria*, *astylusaria* and *propriaria* of Walker's list.

METROCAMPA PERLATA. *Guenée.*

From Vancouver Island and Colorado; it is also in the museum from New York; it is very close to the European *M. margaritata.* Is it really distinct?

TETRACIS AURANTICARIA. *Packard.*

An example from California; it is new to our collection.

TETRACIS PARALLELIA. *Packard.*

A specimen from Sierra Nevada; this is also new to us.

TETRACIS TRUXALIATA. *Guenée.*

Sierra Nevada, California; new to us.

TETRACIS ŒGROTATA. *Guenée.*

Under this name Mr. Edwards sends us two examples, one from Saucelito, California, of a pale, sandy reddish tint, with a feeble pink gloss and with distinct grey stripes connecting the black nervular spots; excepting that it is rather smaller and of a deeper color, it hardly differs from *Sabulodes dositheata,* Guen. which we have from Rio de Janeiro. The other specimen is from San Francisco, is of a paler, sandy yellowish tint, with the grey stripes much less defined. We received a still paler, although very similar form some years ago under the Ms. name of *Chærodes punctata,* Pack. I should say that it is undoubtedly conspecific with *Sabulodes colombiata,* Guen., two examples of which we have from Venezuela, and also with *Chærodes subclararia* and *C. atropesaria,* Walk.

AZELINA HUBNERARIA. *Guenée.*

Two examples from Havilah, and Sierra Nevada, California. They are larger and redder than our specimens and the line across secondaries is less defined; their general coloration is that of *A. nerisaria.* These California specimens exhibit more clearly than I have hitherto seen it, the peculiar pouch-like opening on each side of the abdomen at its base. What is the use of this contrivance?

IDÆIDÆ.*

"ACIDALIA" QUINQUELINEATA. *Packard.*

Two specimens from Nevada. The species belongs to the group *Idæa* of Treitschke. The numerous forms associated under the name of *Acidalia* will have to be distributed into smaller and less heterogeneous groups.

"ACIDALIA" CALIFORNIATA. *Packard.*

Two specimens, California.

To associate this little rounded-winged species with the preceding is most painful, and in the face of the closely related genera of the family *Ennomidæ* seems ridiculous in the extreme. It is probably congeneric with *A. rubricata* of Europe and might be placed with it under *Emmiltis* of Hübner, though its body is somewhat broader than that of the European species.

---

* I suggest this name to supersede *Acidaliidæ* since the name *Acidalia* was first applied to a group of *Argynnides.*

FIDONIIDÆ.

LOZOGRAMMA TRIPUNCTARIA.

Thamnonoma Tripunctaria. Packard.

Sierra Nevada, California.

It is incomprehensible to me why Dr. Packard should have referred this species to *Thamnonoma* (*Halia* auct.); its close affinity to *Lozogramma petraria* of Europe and *L. defluaria* of Nova Scotia must, I should think, be admitted by all who compare the three species; whereas the typical form of *Thamnonoma* is more nearly that of *Macaria*. *L. extremaria* seems to come nearer to *Aspilates? ordinata:* an example (much worn) of *T. marcescaria*, also in this series, has more nearly the character of the genus.

PHASIANE IRRORATA. *Packard.*

Sierra Nevada, California.

Allied to "*Aspilates*" *arenosa* of Natal and *A.? irradiata* of Shanghai, which will certainly have to be placed in the same genus with it.

SELIDOSEMA JUTURNARIA. *Boisduval.*

Sierra Nevada, California: unlike any species known to me, perhaps nearer to *S. sordida* of Japan than to anything else in our collection.

SELIDOSEMA JUTURNARIA. VAR. CALIFORNARIA. *Packard.*

Sierra Nevada, California. It appears to me that this insect ought to be regarded as generically distinct from the preceding; its more compressed and therefore more slender antennæ, less deflexed palpi, narrower primaries, upon which the subcostal branches are crowded together, and distinctly narrower secondaries seem, apart from the general aspect, which is palpably different, to warrant their separation.

EUASPILATES SPINATARIA. *Packard.*

Colorado. The genus appears to me to be identical with *Conchylia*, Guenée (1857); but the latter falls before *Conchylium*, Cuvier (1817) and *Conchylis*, Sodoffsky (1837).

LARENTIIDÆ.

RHEUMAPTERA BRUNNEICILLATA. *Packard.*

South California. We have nothing near to this species.

" GLAUCOPTERYX CÆSIATA. *Hübner.*"

Two specimens, Havilah, California. This is not the European *G. cæsiata*, the latter has the outer edge of the broad belt across the primaries regular and dentated, whereas this species is more like *G. Kollariaria* with a regular sinuated band. I doubt the occurrence of G. *cæsiata* in America, although Packard's figure looks rather like the species: it is probable that the insect now before me is undescribed.

EPIRRITA 12-lineata. *Packard.*

S. Mateo Co.. California. It is apparently congeneric with my *Emmelesia phasma* from Japan, an insect bearing considerable resemblance to *E. albulata* of Europe: the latter, notwithstanding its similarity in size, general form and coloration, differs not a little in neuration, the discoidal cell of the secondaries being altogether smaller and the bifurcation of the sub-costal vein much shorter.

EUPITHECIA CRETACEATA. *Packard.*

Summit of the Sierra Nevada. From its great size this species might readily be mistaken for a *Lobophora*, but its structure agrees better with *Eupithecia.*

PLEMYRIA FLUVIATA. *hübner.*

Two examples. California. New to the collection.

OCHYRIA RUBRO-SUFFUSATA. *Packard.*

Two examples. Havilah, California. This type of coloration is new to me as associated with *Coremia* (to which genus *Ochyria* seems closely allied) it is rather characteristic of *Fidonia;* but in *Ochyria* one looks in vain for the broad plumose antennæ of that genus.

TRIPHOSA PROGRESSATA? *Walk.*

Triphosa dubitata, Packard (non Linn.)

Mendocino, California.

The insect sent by Mr. Edwards agrees in size and general pattern with Packard's figure, but not at all with European specimens of *T. dubitata;* the latter have grey secondaries, with the markings very faintly indicated. The primaries are altogether of a duller color, with the central belt much broader. I doubt the occurrence of *T. dubitata* in America. The example before me is, I believe, a slight variety of Walker's *Scotosia progressata,* from St. Domingo.

PETROPHORA PRUNATA. var. nubilata. *Packard.*

Oregon and Knight's Valley, California. It is allied to "*Cidaria*" *suffumata* of Europe and *C. Pryeri* of Japan.

EUBOLIIDÆ.

CHESIAS OCCIDENTALIATA. *Packard.*

One example Marin Co., California. Quite new to me.

This concludes the series presented to us by Mr. Edwards.

JOSEPH DUNCAN PUTNAM.

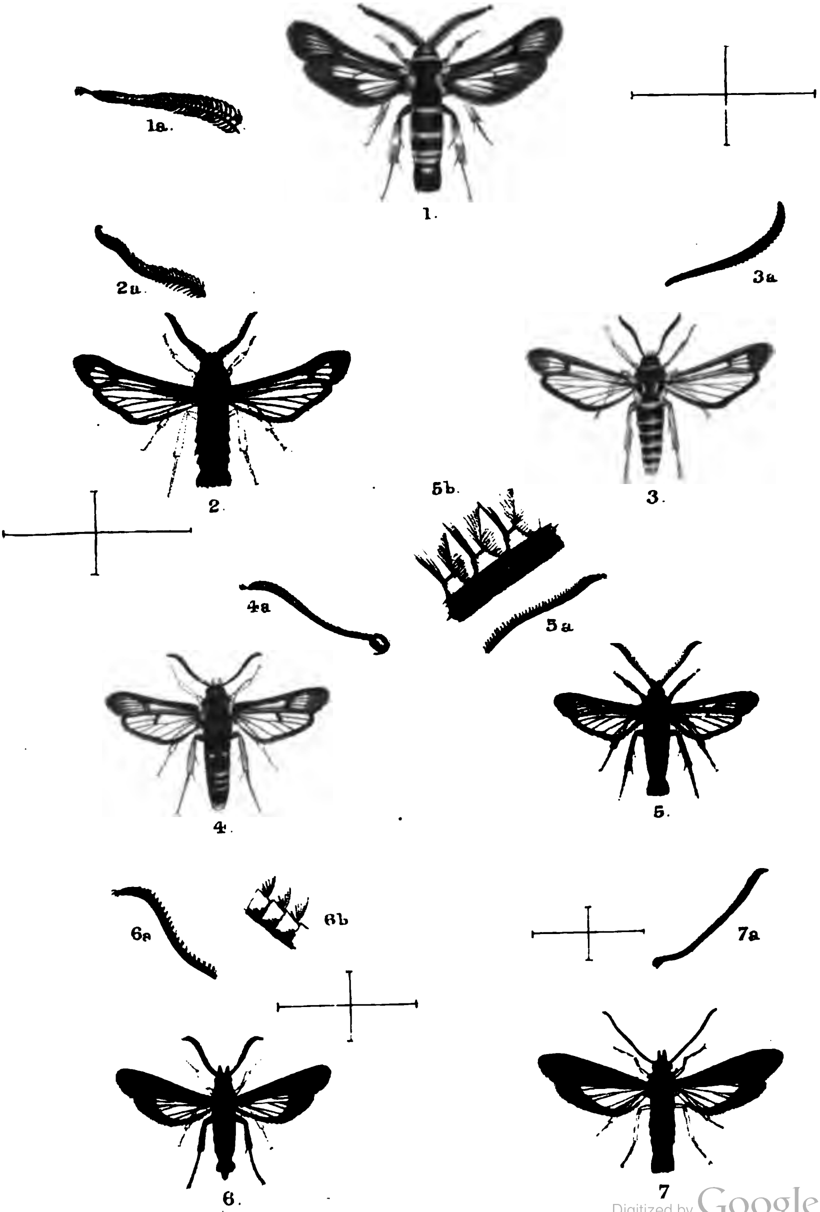
An earnest student, a devoted lover of science, and a kind and amiable man, has just passed away from earth. Joseph Duncan Putnam died on Dec. 10th, at his home, Davenport, Iowa, and in the city which he honored with the labor of his life, there will scarcely be found one to fill the place he occupied. Though suffering for many years past from that dread disease, consumption, and given over as incurable by many physicians, the marvellous strength of will which he possessed, enabled him to make a powerful struggle against the destroyer, and the work he has accomplished even under the pressure of sickness, has been such as few strong and healthy men could have given to the world. He was born at Jacksonville, Ill., in 1855, and was therefore, only 26 years of age at his untimely death.

"At the age of 10 or 11 years he began collecting fossils, minerals, plants, shells and insects, but gradually narrowed down the scope of his intellect, if the statement may be permitted, to the department of entomology. In 1872 he accompanied Dr. C. C. Parry to Colorado, where, during three months spent high up in the mountains, large collections were made in various departments of Natural History. There they were visited by the two eminent botanists, Dr. John Torrey and Dr. Asa Gray. The winter following was spent in hard study. In 1873, again in company with Dr. Parry, he was attached to Capt. Jones' expedition to the Yellowstone, as meteorologist, and carried a barometer for more than 1000 miles on mule back through some of the roughest districts of the Wyoming and the National park. In his reports of this expedition Capt. Jones makes frequent and honorable mention of the deceased, and the important and valuable service which he rendered to the cause of science."

On the founding of the "Davenport Academy of Natural Sciences," in 1867, he was one of its earliest members and devoted himself, heart and soul to the benefit of the society. "On the 28th of April, 1871, he was elected Recording Secretary, a position which he retained until January, 1875, when ill health caused him to resign. He was appointed a member of the Publishing Committee in November, 1875, and Chairman of the same in January, 1877. In November, 1876, he was elected Corresponding Secretary. In the spring of that year he commenced the publication of the proceedings of the Academy, and at the time of his death, he had been for nearly a year President of the Academy, combining with the duties of that office those of Secretary and Editor of the Proceedings." He was essentially a hard worker, too much so, perhaps, for the frail body which enclosed his aspiring and inquiring soul, and in all that he undertook, "thoroughness and truth" was his motto. His papers on *Leucanium acericola, W. and R.* (the Maple barklouse) are valuable contributions to entomology; while his researches into the life-history and classification of the singular Arachnid family, *Solpugidæ*, if he had lived to publish them, would have made his name famous wherever science is known. It is not many months since, that he spent several days in the libraries of New York and Boston, in searching for literature upon this little known group of animals, and it is to be hoped that he has left behind him some MSS. upon this subject. which may yet see the light.

Mr. Putnam was early elected a Corresponding Member of the N. Y. Entom. Club, and manifested the warmest interest in its success, the state of his health and his constant occupation being the only obstacles to his frequent contributions to our columns. He died, as he had lived, full of hope, an earnest, brave, and gentle soul, animated by kindness for all, and leaving behind him none but those who admired his character, and who love and honor his memory. HY. EDWARDS.

Pl.1.



INDEX.

VOLUME I.

INDEX TO AUTHORS AND SUBJECTS.

PAGE.

Introduction 1

Report of Proceedings, with reference to Lepidoptera, of the Entomological Section of American Association for Advancement of Science 123

BUTLER, ARTHUR G.
  Papilio Ecclipsis, L., Notes on 59
  Some N. American Lepidoptera, Notes on 103
  " " " " 128
  " " " " 168
  " " " " 220

COQUILLET, D. W.
  Early Stages of Some Moths 6
  Larva of Teras Permutana, Description of 30
  Notes and Descriptions of a few Lepidopterous Larvæ 56

COMSTOCK, J. HENRY.
  Aquatic Noctuid Larva, an 147

EDWARDS, HENRY.
  Two New Forms of the Genus Parnassius 2
  Descriptions of two New Species of Lithosidæ 12
  New Genera and Species of North American Noctuidæ 19
  Notes on Pacific Coast Species of Hepialus, with Description of New Forms 35
  New Species and Varieties of Arctiidæ 38
  Apparently New Forms of Diurnal Lepidoptera 60
  Pacific Coast Species of Orgyia with Descriptions of Larvæ and New Forms 60
  New Genus and New Forms of North American Zygænidæ 80
  New Species of North American Moths 100
  Descriptions of New Species of Heterocera 115
  New and Remarkable Bombycid from Arizona 171
  New Genera and Species of the Family Ægeride 179
  Biographical Sketch of Joseph Duncan Putnam 223

EDWARDS, WILLIAM H.
  Capture of Diadema Bolina, L. in Florida 30
  Descriptions of New Species of Butterflies, chiefly collected by Mr. Morrison in 1880 43
  New Hesperian from Florida 78
  On Pieris Bryoniæ, Ochs. and its Derivative Forms in Europe and America 84
  Alleged Abnormal Peculiarities of Argynnis Myrina, Remarks on 134
  Preparatory Stages of Thecla Henrici, Grote 150
  On Certain Habits of Heliconia Charitonia, L., a Species of Butterfly Found in Florida 209

Fernald, C. H. PAGE.
Notes on Fitch's Species of Tortricidæ........ 36
" " The Tortricidæ, Tineidæ and Pterophoridæ of S. Africa, by Lord Walsingham."........ 219
French, G. H.
Catocala Sappho. Streck, Notes on........ 57
Larvæ of Some Moths........ 81
Parasite in Ægeria Syringæ, Harr........ 106
New Varieties of Catocala........ 110
Larvæ of two Species of Euclea........ 144
New Variety of Catocala........ 218
Goodell, L. W.
Larvæ of two Noctuids........ 15
Grote, Augustus R.
Descriptions of four New Species of Moths........ 4
Notes on "North American Tortricidæ by Lord Walsingham, F. Z. S. &c"........ 8
North American Species of Eustrotia........ 10
New Insect Injurious to the Hickory........ 13
New Pyralidæ........ 15
Biographical Sketch of M. Achille Guenée........ 31
New Noctuids, with List of Species of Oncocnemis........ 33
Choreutes on Silphium Integrifolium, A........ 40
Description of Geometridæ, chiefly collected by Mr. G. R. Pilate........ 40
New Species of Dicopis, Chytonix and Spragueia........ 48
New Noctuidæ from Washington Territory........ 58
New Western Moths........ 75
Agrotis Repentis, Notes on........ 126
Professor Riley on Dakruma........ 142
New Moths from Arizona, with Remarks on Catocala and Heliothis........ 153
Moths Collected by Prof. Snow in New Mexico, with List of Eudriini........ 174
Gundlach, Juan.
Annotated Catalogue of the Diurnal Lepidoptera of the Island of Cuba. 111
Hagen, Herman.
Papilio Ecclipsis, L. a lost or doubtful North American Butterfly........ 42
Hulst, Geo. D.
Some Remarks upon the Catocalæ, in reply to Mr. A. R. Grote........ 215
Kellicott, D. S.
Larvæ of Catocala Flebilis, and C. Amatrix........ 141
Lintner, J. A.
Importance of Entomological Studies........ 1
On Some Species of Nisoniades........ 69
Corrections of Errors in Paper on Nisoniades........ 122
Neumoegen, Berthold.
New Species of Arctia from Florida........ 9
" " " Colorado........ 28
" " Antarctia from Mount Hood, Oregon........ 79
Remarkable New Geometrid, Description of a........ 145
Little Beauty, from Arizona, A........ 149
New Hemileuca from S. Arizona........ 172
Riley, Charles V.
Lepidopterological Notes........ 106
Stretch, Richard H.
Genus Clisiocampa, Curtis, Notes on, with Descriptions of New Species. 63
Worthington, C. E.
Two New Hesperians........ 132

LIST OF NEW GENERA AND SPECIES DESCRIBED IN VOL. I.

RHOPALOCERA.

FAM. PAPILIONIDÆ.	PAGE.
Anthocaris Coloradensis. Hy. Edw	50
" Morrisonii. Edw	43
Parnassius, var. Hermodur. Hy. Edw	4
" Thor. "	2
FAM. NYMPHALIDÆ.	
Melitæa. var. Baroni "	52
" Colon. Edw	45
" var. Dwinellei. Hy. Edw	51
" Perdiccas. Edw	44
" var. rubicunda. Hy. Edw	52
" var. Wheeleri "	52
FAM. SATYRIDÆ.	
Coenonvmpha. var. pulla. "	51
FAM. LYCÆNIDÆ.	
Lycena speciosa. ♀ "	55
Thecla. var. citima "	53
" " exoleta "	53
" " Mossii "	54
" Muirii "	53
" spadix "	53
" tacita "	53
FAM. HESPERIDÆ.	
Copæodes Eunus. Edw	47
Erycides Okeechobee. Worthn	133
Eudamus Oberon "	132
Nisoniades Petronius Lint	70
" Somnus "	73
Pamphila Mardon. Edw	47
" Siris "	47
" Straton "	78
Pyrgus Philetus "	46

HETEROCERA.

FAM. SPHINGIDÆ.	
Anceryx Edwardsii Butl	105
Sphinx Dollii. Neum	149
" libocedri Hy. Edw	115
" var. Utahensis "	115
FAM. ÆGERIDÆ.	
Ægeria albicornis. Hy. Edw	201
" aurata "	190
" aureola "	194
" Bollii "	191
" brunneipennis "	191
" consimilis "	194
" corni "	190
" corusca "	193
" decipiens "	197
" eupatorii "	195
" flava "	189
" giliæ "	200
" hemizoniæ "	198
" hyperici "	195
" imitata "	196
" impropria "	193
" imperfecta "	198

FAM. ÆGERIDÆ —*Continued.* PAGE.
Ægeria infirma " 195
" inusitata " 201
" Koebelei " 196
" lupini " 192
" madariæ " 201
" mimuli " 200
" morula " 196
" neglecta " 197
" nicotianæ " 202
" Novaroensis Behrens 199
" opalescens Hy. Edw 199
" perplexa " 192
" proxima " 201
" refulgens " 199
" rubrofascia " 191
" saxifragæ " 190
" sexfasciata " 193
" verecunda " 190
" Washingtoniana " 197
Albuna, n. gen. " 186
" artemisiæ " 187
" Coloradensis " 189
" montana " 188
" resplendens " 186
" Rileyana " 187
" rutilans " 186
" tanaceti " 188
" torva " 189
" Vancouverensis " 188
Bembecia sequoiæ " 181
" superba " 181
Carmenta, n. gen " 184
" fraxini " 185
" minuta. " 185
" ruficornis " 184
" Sanborni " 185
Euhagena n. gen " 180
" Nebraskæ " 180
Larunda. n. gen " 182
" solituda " 182
Pyrrhotænia achillæ " 203
" eremocarpi " 203
" fragariæ " 202
" helianthi " 203
" Meadii " 204
" orthocarpi " 204
" polygoni " 202
" Tepperi " 203
" Texana " 204
Sciapteron cupressi " 183
" Graefi " 183
" scepsiformis " 183
Trochilium pacificum " 180
Zenodoxus canescens " 205
" heucheræ " 205
" potentillæ " 205
FAM. ZYGÆNIDÆ.
Anatolmis fulgens " 116
Gnophæla var. continua " 80
Lycomorpha constans " 81
" desertus " 81

FAM. ZYGÆNIDÆ. *Continued.* PAGE.
Penthetria n. gen. “ 80
“ majuscula “ 80
“ parvula “ 80
Scepsis Edwardsii. Grote 4
FAM. LITHOSIDÆ.
Crocota ostenta. Hy. Edw. 12
Nola anfracta “ 12
“ fuscula. Grote 76
FAM. HEPIALIDÆ.
Hepialus anceps. Hy. Edw. 36
“ inutilis “ 36
“ rectus. “ 35
FAM. BOMBYCIDÆ.
Antarctia, var. proba. Hy. Edw. 39
“ rubra. Neum 79
Arctia, var. barda. H. Edw. 39
“ determinata. Neum 28
“ flammea “ 9
“ incorrupta. Hy. Edw. 38
Clisiocampa constricta. Stretch 65
“ erosa “ 67
“ fragilis “ 64
“ strigosa “ 67
“ thoracica “ 68
Euleucophæus Neumoegeni. Hy. Edw. 171
“ sororius “ 100
Euprepia opulenta “ 38
Halesidota ingens “ 39
“ labecula, Grote 174
Hemileuca Yavapai. Neum 172
Orgyia cana. Hy. Edw. 62
“ gulosa. “ 61
Parasa fraterna. Grote 5
Quadrina, n. gen. “ 175
“ diazoma “ 175
Thyridopteryx Meadii. Hy. Edw. 116
FAM. NOCTUIDÆ.
Adonisea var. languida. Hy. Edw. 20
Agrotis clodiana. Grote 76
Annaphila aurantiaca. Hy. Edw. 23
“ pustulata “ 23
Apatela edolata Grote 153
Arzama melanopyga “ 148
Basilodes chrysopis “ 154
Bessula, n. gen “ 176
“ luxa “ 176
Bombycia semicircularis “ 75
Catocala Chelidonia “ 159
“ var. curvata. French 218
“ dulciola, Grote 5
“ var. Emilia. Hy. Edw. 117
“ var. Evelina. French 110
“ var. Hinda “ 111
“ Miranda. Hy. Edw. 111
“ var. Zelica. French 118
Chariclea pernana. Grote 152
Chytonix sensilis “ 45
Deva palligera. “ 39
Dicopis depilis “ 45
Euros, n. gen. Hy. Edw. 18
“ proprius “ 99
Eustrotia aeria. Grote 11

FAM. NOCTUIDÆ.—*Continued.* PAGE.
Fruva accepta. Hy. Edw 24
" acerba " 24
Graphiphora consopita. Grote 154
Grotella sexseriata " 155
Hadena cinefacta " 76
" cymosa " 34
" semilunata " 58
Heliophila bicolorata " 154
Homoptera rubi. Hy. Edw 26
Homopyralis repentis. Grote 165
Litocala, var. deserta. Hy. Edw 25
Lygranthoecia balba. Grote 156
" coercita " 156
" Walsinghami. Hy. Edw 20
Mamestra liquida. Grote 58
" sutrina " 5
Magachyta subflavidalis " 166
Melicleptria belladonna. Hy. Edw 20
" elaborata " 21
" honesta, Grote 77
" perminuta. Hy. Edw 21
Melipotis tenella " 26
Oncocnemis aqualis, Grote 33
" major " 33
Oribates, n. gen. Hy. Edw 22
" limbatus " 22
" Muirii " 22
" opiparus " 117
" versutus " 116
Perigea loculosa, Grote 154
Plusia celsa, Hy. Edw 101
Rhododipsa miniana, Grote 175
Spragueia funeralis " 158
" pardalis " 50
Syneda faceta Hy. Edw 119
" occulta " 118
" var. perpallida " 25
" var. saxea " 26
" var. seposita " 25
Synedoida inepta " 26
" morbosa " 26
" sabulosa " 26
" valens " 119
Tarache sedata " 23
Thyatira lorata. Grote 75
Triocnemis, n. gen. " 77
" saporis " 77
Valeria conserta " 58
Xanthothrix Neumoegeni. Hy. Edw 101
FAM. GEOMETRIDÆ
Aspilates gausaparia. Grote 41
" vividirufaria. Neum 145
Azelina Morrisonaria. Hy. Edw 121
Cymatophora pulmonaria. Grote 167
Deilinea glomeraria " 41
" septemfluaria " 41
Emplocia cephisaria " 177
" fervefactaria " 177
Gorytodes personaria. Hy. Edw 120
Phasiane colata. Grote 167
" hypæthrata " 167
Plagodis floscularia " 40
Zerene elegantaria. Hy. Edw 121

FAM. PYRALIDÆ.		PAGE.
Acrobasis caryæ.	Grote	14
" demotella	"	14
Botis crocotalis	"	167
" toralis	"	178
Cataclysta medicinalis	"	15
Choreutes silphiella	"	40
Eurycreon elautalis	"	168
Hydrocampa pacalis	"	17
Nephopteryx scintillans	"	18
Oligostigma obscuralis	"	18
Paraponyx plenilinealis	"	17
Toripalpus trabalis	"	18

RHOPALOCERA.

Papilionidæ, 4 species and varieties.
Nymphalidæ. 6 " "
Satyridæ 1 variety.
Lycænidæ. 7 " and varieties.
Hesperidæ. 9 "

HETEROCERA.

Sphingidæ. 4 species and varieties.
Ægeridæ. 4 genera, 70 species.
Zygænidæ. 1 genus, 7 species and varieties.
Lithosidæ. 3 species.
Hepialidæ. 3 "
Bombycidæ. 1 genus, 22 species
Noctuidæ. 4 genera, 70 " and varieties.
Geometridæ. 13 species.
Pyralidæ. 12 "
Total : 10 genera, 233 species and varieties.

GENERAL INDEX.

VOLUME I.

PAGE.
Abraxas grossulataria 121
Achlyodes Arcas 114
" gesta 114
" Papinianus 114
" Philemon 114
" Thraso 73
" Velasquez 114
" Vespasius 114
Achillea millefolia 203
Acidalia quinquelineata 221
" Californiata 221
" rubricata 221
Acrobasis Angusella 14
" caryæ 13
" " larva of 13
" demotella 14
Acronycta populi 127
" lepusculina 127
Actinota Stewarti 59
Adelpha basilea 112
Adonisea pulchripennis 20, 21
" " var. languida 20
Ægeridæ n. gen. and sp. of 179
" Walker's sp. of 206
Ægeria acerni 186, 190
" albicornis 200
" asiliformis 200
" aureola 194
" aurata 190
" Bollii 191
" brunneipennis 191
" cephiformis 194
" ceriiformis 190
" consimilis 194
" corni 190
" corusca 193
" decipiens 197
" emphytiformis 206
" eupatorii 195, 196
" flava 189
" fulvipes 190
" geliformis 208
" giliæ 200
" hemizoniæ 198
" hylotomiformis 186, 188, 207
" hyperici 195
" ichneumoniformis 195
" imitata 196

PAGE.
Ægeria imperfecta 198
" impropria 193
" infirma 196
" inusitata 201
" Koebelei 196
" lupini 192
" lycopsiformis 190
" madariæ 200
" mimuli 200
" morula 196
" neglecta 197
" Novaroensis 199
" nicotianæ 202
" odyneriformis 207
" odyneripennis 206, 207
" opalescens 199
" perplexa 192, 193
" pleciæformis 206
" proxima 201
" pyralidiformis 184, 207
" pyramidalis 206
" refulgens 199
" rubrofascia 191
" sapygæformis 207
" saxifragæ 190
" senecioides 198
" sexfasciata 193
" stelidiformis 196
" syringæ, parasite in 106
" tipuliformis 189, 192
" uroceriformis 194
" verecunda 190
" Washingtoniana 197
Ægocera 129
Ænosanda noctuiformis 105
Aganisthos Acheronta 112
" Odius 112
Agraulis vanillæ 214
Agrotis balanitis 127
" brunneigera 127
" clandestina 76
" clodiana 76
" Cochrani 126
" friabilis 127
" fuscigera 127
" gravis 76
" Havilæ 76, 169
" herilis 128

PAGE.

Agrotis impacta 169
" jaculifera 128
" lycarum 126
" messoria 126
" micronyx 127
" pastoralis 153
" pleuritica 153
" repentis 126, 169
" rubefactalis 127
" scandens 126
" segetum 127, 154
" Texana 127, 153
" tricosa 128
Albuna n. gen 186
" artemisiæ 187
" Coloradensis 189
" montana 188
" resplendens 186
" Rileyana 187
" rutilans 186
" tanaceti 188
" torva 189
" Vancouverensis 188
Aletia argillacea 107
Alypia Langtoni 129
" Maccullochii 129
" Ridingsii 129
" Sacramenti 129
Ameria unicolor 153
Ambrosia artemisifolia, the food plant of Tarache erastroides 8
Ambrosia trifida, food plant of Gortyna nitela 107
Ambulyx 104
Ampelophaga rubiginosa 104
" versicolor 104
Amphion Nessus 103
Anartia jatrophæ 111
" Lytræa 111
Anæa Echemus 112
" troglodyta 112
Anatolmis fulgens 116
" Grotei 116
Anceryx Alope 105
" Edwardsii 105
" fasciata 105
" Scyron 105
Annaphila arvalis 23
" aurantiaca 23
" decia 170
" depicta 170
" domina 23
" pustulata 23
" salicis 23
Antaplaga 176
Anthocaris ausonia 51
" ausoniedes 51
" Belia 51
" Cethura 43
" Coloradensis 50
" Cooperi 43
" Hyantis 44, 51
" Morrisonii 43
Anchylopera fragariæ 107
Anomis Xylina 107
Antarctia proba 79
" punctata 39, 79
" rubra 79
" rufula 79
" vagans 79
Apamea connexa 169
" iaspis 49, 50

PAGE.

Apamea unanimis 169
Apatela afflicta 153
" Americana, larva of 6
" brumosa, larva of 56
" edolata 153
" falcula, larva of 6
" lobeliæ, larva of 6
" Perdita 153
" persuasa 153
" superans, larva of 6
" xyliniformis 153
Apatura Druryi 112
" Idyja 122
" Pavonii 114
" Theodora 114
Aquatic noctuid larva 147
Arctia, n. sp. 9, 28, 38
" Achaia 38, 131
" " var, barda 38
" Blakei 38
" caja 37
" cervinoides 29
" decorata, larva of 81
" determinata 28
" flammea 9
" incorrupta 38
" intermedia 131
" nais, larva of 82
" ochracea 131
" phalerata, larva of 82
" Saundersii 131
" virguncula, larva of 7
Archicarus 170
Archippus, hibernation of 124
" number of broods of 124
Argynnis, Bellona, alleged peculiarities in 125, 134
Argynnis, Myrina, alleged peculiarities in 125, 134
Argyrolepia quercifoliana 37
Argyrotoxa conigerana 37
" trifurculana 37
Arthemis, color of 124
Artemisia vulgaris 188
Arzama densa 148
" diffusa 148
" melanopyga 147
" vulnifica 148
Aspilates arenosa 222
" gausaparia 41
" irradiata 222
" Lintneraria 41
" ordinaria 222
" viridirufaria 145
Aspila Rhexiæ 157
Associa'n Advc. Science, Proceed'gs of 123
Azelina Hubneraria 121, 221
" Morrisonaria 121
" nerisaria 221

Basilodes chrysopis 154
" pepita 154, 155
Behrensia conchiformis 59
Bembecia sequoiæ 181
" superba 181
Bessula n. gen 176
" luxa 176
Boarmia pulmonaria 167
Bombycia improvisa 75
" semicircularis 75
Bombycoidæ, larvæ of 168

PAGE.
Bombyx frutetorum ... 68
" drupacearum ... 68
" pseudoneustria ... 64
Botis allectalis ... 178
" augustalis ... 178
" crocatalis ... 167
" fodinalis ... 167
" fracturalis ... 178
" signatalis ... 178
" tatalis ... 178
" toralis ... 178
" ventralis ... 167, 178
" volupialis ... 178
Brachytænia malana ... 36
" triquetrana ... 37
Brenthis Bellona ... 134
" Myrina ... 134
Bryophila palliatricula ... 49, 50
Butler, A. G., articles by . 59, 103, 128, 168, 220
Butterflies, n. sp. of ... 2, 43, 50, 69, 78, 132

Cacoecia ... 37
Californian Lepidopt, variation in ... 35
Calisto Herophile ... 111
Callidryas Agarithe ... 30
Carmenta, n. genus ... 184
" aureopurpur ... 184
" fraxini ... 184
" minuta ... 184
" pyralidiformis ... 184
" ruficornis ... 184
" Sanborni ... 184
Carya porcina, food plant of Acrobasis . 13
Carystus Corydon ... 113
" tripunctus ... 113
Castniidæ ... 128, 177
Cataclysta angulatalis ... 16
" bifascialis ... 16
" fulicalis ... 15, 16
" helopalis ... 16
" medicinalis ... 15, 16
" moniligeralis ... 16
" opulentalis ... 16
Catalogue Cuban Lepidoptera ... 111
Caterva catenaria, larva of ... 56
Catocala abbreviatella ... 163, 164
" adoptiva ... 164
" Agrippina ... 57
" Aholibah ... 171
" Alabama ... 5, 163, 164, 201
" amatrix ... 163
" " larva of ... 141
" Amestris ... 161, 217
" amica, larva of ... 7
" Angusi ... 164, 215
" Anna ... 161, 164, 217
" Arizonæ ... 163, 218
" Aspasia ... 163, 218
" Atarah ... 215
" badia ... 163, 164, 217
" basalis ... 164
" Beaniana ... 163, 217
" Briseis ... 163, 171, 217
" Belfrageana ... 215
" Bunkeri ... 164
" Californica ... 171
" cara ... 57
" cerogama ... 160
" chelidonia ... 159, 164
" Cœlebs ... 163, 164, 217
" Clintonii ... 164
" coccinata, larva of ... 56

PAGE.
Catocala communis ... 158
" concumbens ... 160
" Cordelia ... 6
" cratægi ... 5, 163
" curvata ... 215
" desperata ... 157
" dulciola ... 5, 164
" electilis ... 171
" Emilia ... 116
" Evelina ... 110
" Faustina ... 217
" flavidalis ... 163, 164
" flebilis ... 164
" " larva of ... 141
" formula ... 159, 164
" fratercula ... 164
" " larva of ... 7
" fraxini ... 160
" Frederici ... 164
" Gisella ... 164
" gracilis ... 159
" grynea ... 169, 162
" habilis ... 164
" Herodias ... 164
" Hilda ... 111
" Ilia ... 160
" illecta ... 159, 211
" innubens ... 111, 163, 171
" insolabilis ... 163
" Irene ... 171
" lachrymosa ... 57, 110, 111
" Levettei ... 118, 164
" lineella ... 164
" Mariana ... 171, 215
" Meskei ... 163, 164, 215
" minuta ... 159
" mira ... 163
" Miranda ... 118
" neogama ... 158
" nuptialis ... 162, 163
" obscura ... 162
" Ophelia ... 160
" parta ... 33, 171
" parvula ... 159
" paleogama ... 111
" Paulina ... 110
" perplexa ... 215
" phalanga ... 111, 164
" piatrix ... 164
" polygama ... 6, 163
" ponderosa ... 164
" præclara ... 5, 163, 164, 211
" pretiosa ... 163
" pura ... 163, 218
" relicta ... 160
" retecta ... 164
" Robinsonii ... 164, 218
" residua ... 163, 164, 215
" Sappho ... 57
" scintillans ... 164
" semirelicta ... 163, 164, 217
" similis ... 159
" simulatilis ... 164
" sinuosa ... 164
" Snowiana ... 164, 215
" sordida ... 159, 164
" subnata ... 158, 164
" tristis ... 118
" ultronia ... 164
" unijuga ... 163, 217
" Verrilliana ... 160, 164, 171
" vidua ... 215

PAGE.
Catocala Walshii ... 163, 218
" Whitneyi ... 163, 215
" Zelica ... 111
" Zoe ... 160
Catopsilia Agarithe ... 112
" Argante ... 112
" Avellanada ... 112
" Eubule ... 112
" Godartiana ... 112
" Neleis ... 112
" Statira ... 112
" Thalestris ... 112
Cautethia ... 105
Celena exesa ... 32
Ceratocampidæ ... 175
Cenopis gracilana ... 9
Chærodes atropesaria ... 221
" punctata ... 221
" subclararia ... 221
" transferens ... 220
Chamyris cerintha, larva of ... 56
Chalcoela aurifera ... 16
" Robinsonii ... 16
Charadra propinquelinea, larva of ... 15
Charadara Palata ... 153
Chariclea ... 77
" pernana ... 155
Chenopodium, food plant of Mamestra and Plusia ... 7, 107
Chesias occidentaliata ... 223
Chloraspilates bicoloraria ... 145
Choreutes on Silphium integrifolium ... 40
" pretiosana ... 40
" silphiella ... 40
Chrysendeton ... 16
Chytonix Iaspis ... 49
" sensilis ... 49
Cidaria Pryeri ... 223
" suffumata ... 223
Citheronia sepulcralis ... 175
Ciris Wilsoni ... 177
Cleoceris onchina ... 32
Clisiocampa, the genus ... 63
" Californica ... 64, 132
" " larva of ... 64
" " habits of ... 64
" constricta ... 65
" " larva of ... 66
" decipiens ... 68
Clisiocampa distria ... 67
" erosa ... 67
" " larva of ... 67
" fragilis ... 64
" neustria ... 66
" strigosa ... 67
" sylvatica ... 68
" thoracica ... 68
Clothilda Cubana ... 111
" numida ... 111
" pantherata ... 111
Coatlantona Perezi ... 111
Coenonympha Californica ... 51
" galactina ... 51
" pulla ... 51
Coloradia Pandora ... 175
Comstock, J. Henry, article by ... 147
Conchylia ... 222
Conchylis ambiguella ... 109
Conopia ... 207, 208
Copœodes Eunus ... 43, 47
Copidryas Gloveri ... 129, 177
Coquillet, D. W., articles by ... 6, 30, 56

PAGE.
Coremia ... 223
Cornus sericea ... 190
Cossidæ, position of the family ... 128
Cotton worm ... 107
Crambus vulgivagellus ... 125
Crepis, food plant of Plusia ... 107
Crocota ... 153
" ostenta ... 12
Croesia Persicaria ... 36
Ctenucha multifaria ... 130
" rubroscapus ... 130
" Walsinghami ... 130
Cuba, Diurnal Lepidopt. of ... 111
Cupido Ammon ... 112
" Cassius ... 112
" Hanno ... 112
" isophthalma ... 112
Curious history of butterfly ... 134
Cymatophora pampinaria ... 82
" " larva of ... 16
" pulmonaria ... 153, 167
" umbrosaria ... 167
Cynogon ... 103
Cypa ... 103

Dahana atripennis ... 130
Daimia Thetys ... 72
Dakruma turbatella ... 108, 142
Danais Archippus ... 124
" Erippus ... 111
" Gilippus ... 111
Daptonoura Ilaire ... 112
" Salacia ... 112
Deiopeia aurea ... 110
Delinea glomeraria ... 41
" septemfluaria ... 41
Deva, distinct from Plusia ... 35
" palligera ... 35, 59
" purpurigera ... 35
Diadema Bolina ... 30
" capture in Florida ... 30
Dicopis, n. sp. of ... 48
" damalis ... 49
" depilis ... 49
" electilis ... 49
" muralis ... 49
" Thaxterianus ... 49
" vitis ... 49
Dicymolomia decora ... 16
Dione Vanillæ ... 111
Dismorphia Cubana ... 112
" Spio ... 112
Ditula Blandana ... 37
Diurnal Lepidopt of Cuba ... 111
Doryodes, ocelli in ... 32
Dryobota stigmata ... 49
Dynamine Egæa ... 112
" Mylitta ... 112

Eacles ... 175
Eccopsis Footiana ... 219
" Wahlbergiana ... 219
Echeta albipennis ... 4
Edwards, Henry, articles by ... 2, 12, 19, 35, 38, 60, 80, 100, 115, 171, 179 ... 223
Edwards Wm. H., articles by ... 30. 43, 78, 84, 134, 150 ... 209
Edwardsia brillians ... 12
Elibia dolichus ... 104
Emmelesia albulata ... 222
" phasma ... 222

PAGE.

Emmiltis 221
Emplocia cephisaria 177
  " fervefactaria 177
Emprepes novalis 178
Endropia astylusaria 220
  " effectaria 220
  " madusaria 220
  " pectinaria 220
  " propriaria 220
  " tigrinaria 220
Ennomidæ 220, 221
Entomological studies, importance of .. 1
Enyo camertus 104
  " lugubris 103
Eochroa 131
Epirrita 10-lineata 222
Epphippohora caryana 37
Erastria albidula 11
  " apicosa 11
  " carneola 11
  " malaca 11
  " mitographa 11
  " muscosala 11
  " musta 11
  " migritula 11
  " secta 11
  " synochitis 11
Erycides Batabane 113
  " Ocheechobee 133
Euaspilates spinataria 222
Euchetes collaris 131
Euclidia capiticola 171
  " cuspidea 171
  " petricola 171
Euclea monitor, larva of 145
  " pœnulata " " 144
Eudamus Nevada 74
  " Oberon 132
  " Proteus 14
  " Pylades 74
  " Sumadue 114
  " Tityrus 74, 133
  " Trinidad 114
Eudemis botrana 109
Eudrüni list of 177
Eudryas assimilis 177
  " brevipennis 177
  " grata 177
  " unio 177
Eueides cleobra 111
Euhagena n. genus 180
  " Nebraskæ 181
Eulimacodes scapha 132
Euleucophæus Neumoegeni 171
  " sororius 100
Euleucyptera cumatilis 157
Eumæus Atala 112
Eunica Monima 111
  " Heraclitus 111
  " Tatila 111
Eupatorium purpureum 195
Eupithecia cretaceata 223
  " interruptofasciata larva of .. 56
Euprepia opulenta 38
Euptoieta hegesia 111
Eurema albina 112
  " Amelia 112
  " Arabella 112
  " Bulea 112
  " citrina 112
  " conjimjens 112
  " Cubana 112

PAGE.

Eurema Dina 112
  " ebriola 112
  " Elathea 112
  " Fornsii 112
  " Gnathene 112
  " Gundlachia 112
  " Iradia 112
  " Jucunda 112
  " Laræ 112
  " Lisa 112
  " Lucina 112
  " Messalina 112
  " Nicippe 112
  " Palmyra 112
  " Proteipia 112
Euros n. genus 19
  " proprius 19
Eurycreon elautalis 198
Euryptychia saligneana 109
Euscirrhopterus Poeyi 177
Eustrotia Æria 11
  " caduca 11
  " carneola, larva of 7
  " dividua 11
  " Mariæ 11
  " N. Amer. sp. of 10
  " retis 11
Eutolype Rolandi 48
Eutrapela elementaria 220
  " falcata 220
Exartema 219

Feniseca Tarquinius 151
Fernald, C. H., articles by 36, 219
Fidonia 223
Fitch's Tortricidiæ 36
Fraxinus, injured by Ægeridæ 184
French, G. H., articles by .. 57, 81, 106,
  110, 144 218
Fruva accepta 24
  " acerba 24

Geometridæ, n. species of 40
Geometrites 220
Glaucopis rubroseapus 130
Glaucopteryx cæsiata 222
  " Kallariaria 222
Gloveria Arizonensis 100, 175
Gnophæla, is the genus Arctian 129
  " continua 80
  " equinoctialis 130
  " Hopfieri 129
  " vermiculata 80
Gonepteryx Moerula 113
Goodell, L. W. article by 15
Gortyna 148
  " nebris 107
  " nitela 107
  " " feeds on Ambrosia ....
  trifida 107
Gorytodes personana 120
  " uncanaria 120
Graphiphora consopita 154
  " oviduca 154
  " perbrunnea 154
  " rufula 154
Grapholitha caryæ 37
Grote, A. R. articles by 4, 8, 10, 13,
  15, 31, 33, 40, 48, 58, 75,
  126, 142, 153 174
Grotella septempunctata 155
  " sexseriata 153, 155

PAGE.
Guence, A. biograph sketch of 31
Gueneria 33
Gundlach, Juan, article by 111
Gynecia dirce 112

Hadena arctica 34
" castanea 34, 59
" convergens 170
" curvata 59
" cymosa 34, 59
" divesta 59
" indirecta 59, 170
" inordinata 59
" norma 59
" semilunata 58
Hagen, H. H. article by 42
Halesidota Edwardsi 175
" ingens 39
" labecula 174
" sobrina 39
Hedya Scudderiana 109
Heliconidæ, flight of 209
" immunity from birds, &c 209
" odor of 209
Heliconia charitonia, habits of 123, 209
" larva of 210
" chrysalis of 210
Heliothis armiger 158
" cupes 127
" dipsaci 158
" imperspicua 156
" interjacens 158
" luteitinctus 158
" " larva of 57
" maritima 158
" phlogophagus 158
" spectanda 157
" sulmala 157
Heliophila bicolorata 154
" prægracilis 103
Hemaris cynoglossum 103
" metathetis 103
Hemileuca Diana 174
" Juno 174
" Nevadensis 131
" Yavapai 172
Hemizonia luzulifolia 198
Hepialus anceps 36
" Behrensii 35
" inutilis 35
" Lenzii 35
" modestus 35
" montanus 35
" rectus 35
" sequoiolus 35
" Tacomæ 35
Hesperia crisis 113
" Labeo 115
" Syrictus 113
" Ulpianus 115
Hesperidæ, n. sp. from Florida 78
Heteranda disparitis 177
Heuchera rubescens 205
Hickory, insects injurious to 13
Homeosoma 108
Homoptera atrilineata 28
" rubi 28
Homopyralis discalis 165
" repentis 165
" tactus 165
" tantillus 166
Honora 108

PAGE.
Hydrocampa ekthlipsis 17
" formosalis 17
" geminalis 17
" pacalis 17
Hypanartia Paullus 111
Hyperchiria 175
Hypna Clytemnestra 112
" Iphigenia 112
Hypolimnas Bolina 112
Hyloicus Dollii 149
Hyrmina 131

Idæa 221
Idæidæ 221
Ino 80

Insects, crops affected by 2
" study of 2
" depredations of 2, 64, 69
Isognathus scyron 105
Ithomia Cubana 111

Jaspidea 49
Junonia Genoveva 111
" Lavinia 111
" Zonalis 111

Kricogonia Lyside 113

Larentida 222
Larunda, n. genus 180, 182
" solitudal 182
Lasiocampidæ 169
Leucanium acericola 224
Leucanitis 218
Limacodidæ 169
Lintner, J. A., articles by 1, 69, 122
Litocala sexsignata 171
Lobophora 224
Lozogramma defluaria 222
" extremaria 222
" petraria 222
" tripunctaria 222
Lygranthœcia acutilinea 157
" atritas 157
" inclara 157
" Spraguei 177
" tuberculum 157

Macaria 222
Madaria elegans 201
Malacosoma disstria 68
Mamestra assimilis, larva of 15
" cinnabarina 59, 169
" cuneata 5, 59, 169
" cinefacta 76
" distincta 48, 77
" legitima 58
" lilacina 58
" liquida 58
" passer 32
" sutrina 5
" trifolii, larva of 7
Megachyta lituralis 166, 167
" subflavidalis 166
Megaleura Chiron 112
" Eleucha 112
" Poeyi 112
Meganostoma Cesonia 59, 113
Melicleptria belladonna 20
" diminutiva 20, 170
" elaborata 20

PAGE.
Melicleptria honesta 77
" Oregonica 77, 170
" perminuta 20
" villosa 20
Melipotis tenella 26
Melitæa anicia 52
" Baroni 52
" Colon 43, 45, 46
" chalcedon 44, 45, 46, 51, 52
" Dwinellei 51
" nubigena 52
" Perdiccas 43, 44
" Quino 52
" rubicunda 52
" variation in species of 51
" Wheeleri 52
Melittia 180
Metrocampa margaritata 221
" perlata 221
Mimas 103
Morpheis smerintha 128
Moths, early stages of..6, 15, 30, 40, 56, 60, 64, 66, 67, 107, 141, 144,... 147
Myclois convolutella 108
Mythimna culea 32

Nathalis Iole 113
Nephopteryx scintillans 18
Neumoegen B., articles by....9, 28, 79, 145, 149, 171
Nisoniades Arcas 114
" Braco 114
" Brizo 71
" brunnea 114
" concolor 114
" funeralis 69
" Horatius 71
" Icelus 71
" Juvenalis 69
" Martialis 70
" Nævius 69
" Otreus 114
" Petronius 70
" Persius 70
" Philemon 114
" Propertius 70
" Potrillo 114
" Somnus 71
" Terentius 70
" tibial hairs of 72
" Tibullus 71
" undulatus 114
" Virgilius 71
" Zarucco 114
" Zephodes 114
Noctuomorpha normalis 170
Nola anfracta 11
" furcula 76
" minuscula 76
Nolaphana 36
Notice to subscribers 82
Nuphar advena, food plant of Arzama melanopyga 148
Nymphalis Bolina 30

Ochria 148
Ochyria rubrosuffusata 223
Œta compta 110
" " egg of 110
Oligostigma albalis 18
" obscurali 18

PAGE
Oncocnemis aqualis 34, 34
" aterrima 34
" angustus 43
" atricollaris 34
" Behrensii 34
" Chandleri 34
" cibalis 34
" Dayi 34
" Glennyi 34
" Hayesi 34
" homogena 34
" levis 34
" major 34
" Meadiana 34
" mirificalis 34
" oblita 34
" occata 34
" Saundersiana 34
Opisthograptis sulphuraria 220
Orgyia antiqua 62
" badia 62
" cana 62
" food plants of 62
" gulosa 61
" larvæ of 60, 61
" leucostigma 62
" nova 62
" vetusta 60
Oribates n. genus 22
" changed to Gyros 117
" limbatus 22, 117
" Murii 22, 117
" opiparus 117
" versutus 116
Orthocarpus luteus 204
Orthosia crispa 169
" lævis 169
" Lizetta 169
" postica 127
Otus choerilus 104
" Myron 104
Ovios 177
Oxylos citrinellus 179

Pœdisca affusanna 109
" crambitana 9
" agricola 48
Pamphila Amadis 113
" Amyntas 113
" Arcas 113
" Arpa 79
" Baracoa 113
" Cornelius 113
" Coscinia 113
" Cubana 113
" Ethlius 113
" Flyas 113
" Leonardus 79
" Magdalia 113
" malitiosa 113
" Majo 113
" Mardon 43, 47
" misera 113
" Palæa 115
" Philemon 113
" Phylæus 113
" radians 113
" Sandarac 113
" Sirius 43, 47
" singularis 113
" Straton 78
" sylvicola 113

PAGE.

Pamphila Utha 115
" Velasquez 113
Papilio, objects of 1
" contributors to 1
Papilio Andræmon 113
" Androgeus 113
" Caiguanabus 113
" Celadon 113
" Cresphontes 113
" Crephontinus 113
" ecclipsis 42, 59
" " a fictitious sp. 59
" Gundlachianus 113
" Oviedo 113
" Oxynius 113
" Pelaus 113
" Polydamas 113
" Polyxenes 113
" Thoas 113
" Villiersii 113
Parasite in Ægeria syringæ 106
Paranthene 184
Parasa chloris 5
" fraterna 5
" viridus 5
Paraponyx plenilinealis 17
Pareuchetes 176
Parnassius Clarius 3
" Corybas 4
" Delphius 3
" Eversmanni 3
" Hermodur 4
" Smintheus 4
" Thor 2
Parthenos 218
Pempelia grossulariæ 108, 143
" Hammondi 143
Penthetria n. genus 80
" majuscula 80
" parvula 80
Penthina vitivorana 108
Pericopis Aglaura 130
" Catalina 129
Perigea loculosa 154
Petrophora nubilata 223
" prunata 223
Phalœna castrensis 68
" neustria 68
" punctella 110
Phalænites, ocelli in 33
Phaneretoma tibialis 14
Phasiane colata 167
" hypœthrata 167
" irrorata 222
" Snoviata 167
Phoxopteris comptana 109
Phycis grossulariella 108, 143
Phycidæ 13, 142, 143, 144
Phœogenes ater 106
Phyciodes Frisia 111
" Pelops 111
Phryganidea Californica 131
" location of genus 131
Pieris, acadica 87, 98
" brassicæ 94
" bryoniæ, and derivative forms 84
" borealis 92, 98
" casta 91, 93, 98
" castoria 94, 98
" cruciferarum 93, 98
" dates of capture of 96
" flava 98

PAGE

Pieris frigida 91, 98
" Hulda 88, 95, 98, 99
" Ilaire 30
" monuste 112
" napææ 84, 95, 98
" napi 84, 89, 90, 94, 98
" nasturtii 89, 98
" Nova Angliæ 94
" oleracea 87, 89, 90, 92, 93, 95, 97, 98
" " æstiva 87, 91, 93, 94, 98
" " hyemalis 89, 91, 93, 94, 97, 98
" pallida 87, 94, 95, 97, 98
" protodice 95
" rapæ 93, 94, 96
" sabellicæ 85
" table of species of 98
" venosa 87, 88, 94, 97, 98
" vernalis 95
" Virginiensis 94
" probably extinct 96
Pinipestis Zimmermanni 13
Pines injured by Bembecia 181
Pippona bimatrix 176
Plagodis floscularia 40
Plemyria fluviata 223
Plusia brassicæ 106, 127
" Californica 170
" celsa 101
" dyaus 170
" gamma 101, 170, 170
" labrosa 59
" ni 127
" octoscripta 101
" precationis 101
" thyatiroides 33
" u-aureum 101, 170
" verticillata 170
" viridisigma 101
Polygonum aviculare, food plant of Arctias 7
Polygonum maritimum 202
Polygonum Pennsylvanicum, food plan of Pyrrhia 8
Populus grandidentata, food plant of Catocala amatrix 142
Prepona Antimache 112
Procris 80
Prodenia autumnalis 127
" commelina 128
" lineatella 128
Proserpinus 103
Proteopteryx emarginana 9
Proteides alameda 113
" antiqua 113
" corrupta 113
" Cunaxa 113
" mesogramma 113
Pseudorthosia variabilis 154
Pseudohazis eglanterina 132
Psychidæ 131
Pterogon Clarkiæ 103
" œnotheræ 103
" proserpina 103
Pterophoridæ of S. Africa 219
Putnam, J. D., Biogr. sketch of 223
Pyrameis Atalanta 111
" Cardui 111
" Virginiensis 111
Pyrgus cæspitatis 73
" centaureæ 73
" ericetorum 73
" oceanus 73

PAGE.
Pyrgus Petreius........................ 73
" Philetas....................43, 73
" Ricara........................ 73
" scriptura........................ 73
" tesselatus....................46, 73
" tibial hairs in.................... 73
" Xanthus........................ 73
Pyrophila glabella.................... 155
Pyropteron.......................... 208
Pyrrhia angulata, larva of.............. 8
Pyrrhotænia achillæ.................. 203
" eremocarpi.............. 203
" fragariæ.............. 202
" helianthi.............. 203
" Meadii.............. 204
" orthocarpi.............. 204
" Polygoni.............. 202
" Tepperi.............. 203
" Texana.............. 204

Quadrina n. genus.................... 175
" diazoma.................... 175
Quercus agrifolia, food plant of Clisiocampa.......................... 66
Quercus Sonomensis, food plant of Clisiocampa....................... 66
Quercus sps., food plants of Orygia gulosa.......................... 61

Rheumaptera brunneicillata........... 222
Rhodophora.......................... 176
Rhododipsa miniana.................. 175
" volupia.................. 176
Riley, C. V., article by.............. 106
Robinia pseudacacia, food plant of Clisiocampa........................ 67

Sabulodes colombiata................ 221
" dositheata................ 221
Salvia splendens, frequented by Eudamus............................ 74
Saturnia Mendocino.................. 132
Saturnidæ......................131, 169
Scarabeus 3-dentatus................ 42
Scepsis Edwardsii.................... 4
" fulvicollis.................... 4
Schinia gracilenta.................... 156
Sciapteron cupressi.................. 183
" Graefi.................. 183
" robinæ.................. 199
" scepsiformus.................. 183
" syringæ.................. 183
" " larva of.......... 184
Scolecocampa........................ 149
Scoliopteryx libatrix, larva of.......... 56
Selidosema Californaria.............. 222
" juturnaria.............. 222
" sordida.............. 222
Senecio Douglasii.................... 199
Sequoia sempervirens, injured by Bembecia.......................... 181
Siderone Ide........................ 112
Silphium integrifolium, food plant of Choreutes.......................... 40
Smerinthus ophthalmicus.............. 104
Solpugidæ.......................... 224
Spælotis ravida...................... 169
Sphida obliquata...................... 148
Sphinx Chersis....................104, 115
" Dollii.................... 149
" drupiferarum.................... 115
" leucophæata.................... 105
Sphinx libocedri...................... 115
" oreodaphne................104, 115
" perelegans................ 105
" Utahensis................ 115
Spilonota roborana.................. 109
Spintherops.......................... 218
Spragueia, n. species of.............. 48
" dama.............. 50
" funeralis.............. 158
" pardalis..............50, 158
" structure of.............. 50
Stenoptycha......................108, 143
Stretch, R. H., article by.............. 63
Sylectra mirandalis.................. 166
Syneda adumbrata..................25, 118
" divergens..................25, 171
" faceta.................. 118
" graphica.................. 118
" Hastingsii.................. 25
" occulta.................. 118
" perpallida.................. 25
" saxea.................. 26
" seposita.................. 25
Synedoida inepta....................27, 28
" morbosa.................. 27
" sabulosa.................. 26
" valens.................. 118
Synnoma lynosyrana.................. 9
Syntomeida.......................... 130
Syringa Persica, injured by Ægeridæ.. 184

Tamila velaris........................ 176
Tarache inocula...................... 155
" erastroides.................. 8
" sedata.................. 23
" virginalis.................. 155
Telegonus Habana.................... 114
" Jagua.................... 114
" Maysi.................... 114
" San Antonio.................... 114
" Talus.................... 113
" Xagua.................... 114
Teras................................ 36
" occycoccana.................. 110
" permutana, larva of.......... 30
Tetracis ægrotata.................... 221
" auranticaria.................. 221
" parallelia.................. 221
" truxaliata.................. 221
Thalpochares........................ 10
Thamnonoma marcescaria.............. 222
" tripunctaria.............. 222
Thanaos paterculus.................. 115
Thecla adenostomatis................ 53
" Angelia.................. 114
" arsace.................. 53
" Aon.................. 114
" Celida..................112, 114
" citima.................. 52
" coelebs.................. 114
" crysalus.................. 52
" Cybira.................. 114
" exoleta.................. 52
" Henrici..................53, 125
" " early stages of.......... 150
" Irus..................52, 152
" Limenia.................. 114
" Martialis.................. 114
" Marius.................. 114
" Mæsites.................. 114
" Mossii.................. 52
" Muirii.................. 52

PAGE.
" Nelsoni.......................... 52
" paseo............................ 114
" Poeas 151
" Putnami.......................... 52
" Simæthis......................... 114
" spadix........................... 52
" tacita........................... 53
" Tollus........................... 114
Thyatira lorata....................... 75
" pudens........................... 75
Thymele Cassander..................... 113
" marmorosa........................ 113
" Proteus 113
" Santiago......................... 113
" Vespasius........................ 113
Thymelicus nanus...................... 113
Thyridopteryx ephemeriformis.......... 116
" Meadii........................... 116
Tinea pustulella...................... 110
Tineidæ of S. Africa.................. 219
Tortricidæ of S. Africa............... 219
" " N. America.............8, 36
" Fitch's species of............... 36
" errors of determination in .. 36
Tortrix botrana....................... 108
" conigerana....................... 37
" Cinderella....................... 109
" flaccidana....................... 37
" malivorana....................... 109
" occycoccana...................... 109
" quercifoliana.................... 37
" trifurculana..................... 37
" vaccinivorana.................... 109
Toripalpus breviornatalis............. 18
" trabalis......................... 18
Triocnemis n. genus................... 77
" saporis.......................... 77

PAGE.
Triphosa dubitata..................... 223
" progressata...................... 223
Trochilium apiforme................... 180
" pacificum........................ 180

Valeria conserta...................... 58
Victorina steneles.................... 112

Walsingham, Lord, on articles by....8, 219
Weisman, Dr., experiments with Pieris bryoniæ.............................. 84

Xanthothrix Neumoegeni................ 101
" ranunculi........................ 170
Xyleutes.............................. 129
Xylina antennata...................... 127
" cinerea.......................... 127
Xylinidæ.............................. 169
Xylomiges crucialis................... 59
Xylophasia mucens..................... 170
Xystus robiniæ........................ 128

Yukon river, Alaska, insects from....2, 38

Zanclognatha lævigata................. 167
Zenodoxus canescens................... 205
" heucheræ......................... 205
" potentillæ....................... 205
Zerene catenaria...................... 121
" elegantaria...................... 121
Zophodia Bollii....................... 143
" convolvutella.................... 108
" dentata.......................... 143
Zygænidæ n. gen. and sp. of...80, 129, 131.......... 177

ERRATA ET CORRIGENDA.

Page 3, line 31, substitute "r" for "R" in 3rd word.
" 5, " 36, for "Catacola" read "Catocala."
" 6, " 40, after "proceeds" insert "one."
" 7, " 38, for "imagoes" read "imagos."
" 8, " 5, " " " "
" 8, " 15, " " " "
" 8, " 22, " " " "
" 10, " 31, for "Wissfield" read "Wittfeld."
" 13, " 8, substitute "n" for "N" in 3rd word.
" 14, " 2, for "imagoes', read "imagos."
" 15, " 35, for "ochery" read "ochrey."
" 16, " 4, ' " " "
" 19, " 6, in "marking" add "s."
" 20, " 7, for "crimson" read "cinnamon."
" 24, " 15, for "concolorus" read "concolorous."
" 26, " 3, after "1" add "♂."
" 26, " 18, for "♂" substitute "♀."
" 29, " 20, for "latten" read "latter."
" 30, " 12, for "imagoes" read "imagos."
" 30, " 28, for "habital" read "habitat."
" 30, " 35, for "Pieni" read "Pieris."
" 30, " 35, for "Ilaiare" read "Ilaire."
" 35, " 27, add a comma after "Colias."
" 35, " 34, for "Scequoilus" read "Sequoiolus."
" 38, " 41, for "primiaries" read "primaries."
" 40, " 36, for "imagoes" read "imagos."
" 41, " 39, for "I. R. Pilate" read "G. R. Pilate."
" 43, " 5, for "Peridiceas" read "Perdiocas."
" 43, " 15, for "grayish" read "yellowish."
" 44, " 8, for "Perdiceas" read "Perdiccas."
" 51, " 17, for "Crensa" read "Creusa."
" 53. " 10, substitute "t" for "T."
" 58, " 7, add "and" between "Lilacina" and "Legitima."
" 59, " 11, for "as" read "a."
" 59, " 12, for "Hadeva" read "Hadena."
" 59, " 25, dele "semilunata."
" 70, " 2 of foot note, for "spot's" read "spots."
" 71, " 30, for "Iuvenals" read "Juvenalis."
" 72, " 4, dele "in the Middle and Eastern States."
" 72, " 22, after "met with" add "in the Middle and Eastern States.
" 73, " 4, for "Cæspitabis" read "cæspitatis."
" 73, " 4, dele foot note of the page.
" 81, " 19, for "L. pholu" read "L. pholus."
" 94, " 6, for "sometime" read "sometimes."
" 99, " 31, 1st column dele "Napææ," and place it in 2d column thus

EUROPEAN

SUMMER FORMS.

3 Napææ. (Europe.)

Page 100, line 28, for "♀" substitute "♂."
" 100, " 29, for "♂" substitute "♀."

Page 104, line 16, for "Amphelophaga" read "Ampelophaga."
" 104, " 23, for "represnt read "represent."
" 105, " 45, for "Cauthetia" read "Cautethia."
" 111, " 34, 1st col., for "Dimeter" read "Demeter."
" 112, " 41, 1st col., for "Lemoniid" read "Lemoniidæ."
" 112, " 43, 1st col., for "Libythæa" read "Libythea."
" 112, " 47, 1st col., for "Isopthalma" read "Isophthalma."
" 113, " 18, 1st col., for "Villersi" read "Villiersi."
" 113, " 35, 1st col., for "Marmorea" read "Marmorosa."
" 113, " 39, 1st col., for "Hoppfer" read "Hopffer."
" 113, " 41, 1st col., for "Achylodes" read "Achlyodes."
" 113, " 21' 2nd col., for "Mayo" read "Mago."
" 113, " 22, 2nd col., for " " "
" 113, " 24, 2nd col., for " " "
" 113, " 44, 2nd col., for " " "
" 113, " 40, 2nd col., for "Cuxana" read "Cunaxa,"
" 113, " 48, 2nd col., for "Syricthus" read "Syrictus."
" 113, " 58, 2nd col., after "Zephodes" dele "Cr." and put in "Hubn."
" 114, " 6, for "Achylodes" read "Achlyodes."
" 114, " 24, for "Pasco" read "Paseo."
" 114, " 34, for "Amnon" read "Ammon."
" 114, " 35, for "Astinida" read "Astenida."
" 114, " 36, for " " "
" 114, " 37, for "Sumadus" read "Sumadue."
" 114, " 39, for "Endamus" read "Eudamus."
" 114, " 43, for "Jaqua" read "Jagua."
" 114, " 44, for "Nisoniadus" read "Nisoniades."
" 115, " 18, for "Libocedrus" read "Libocedri."
" 129, " 42, reverse "p" in "Gnophæla."
" 132, " 17, for "Endamus" read "Eudamus."
" 141, " 16, for "thoacic" read "thoracic."
" 142, " 32, for "thich" read "thick."
" 155, " 44, for "ocher" read "ochre."
" 156, " 45, for "Stecker" read "Strecker."
" 157, " 19, for " " "
" 161, " 44, for "to far" read "too far."
" 163, " 22, for "Uniguga" read "Unijuga."
" 163, " 40, for " " "
" 169, " 15, for "coccoon" read "cocoon."
" 172, " 16, for "stigmota" read "stigmata."
" 172, " 30, for "other" read "others,"
" 175, " 35, for "ochery" read "ochrey."
" 176, " 45, for "Copidryus" read "Copidryas."
" 182, " 17, for "obselete" read "obsolete,"
" 185, " 31, for "8 m. m." read "16 m. m."
" 188, " 38, after "Exp. wings" add "24 m. m."
" 189, " 32, for "tipulifornis" read "tipuliformis."
" 201, " 20, for "margin" read "margins."
" 204, " 25, for "opposite" read "between the eye and the light."

NOTE.—Subscribers are requested to notice that the whole of the paper on Thecla Henrici, by W. H. Edwards, p. p. 150, 151, 152, has been reprinted, and forwarded with No. 11. The corrected copy should be inserted in the place of that in the body of the work.

EXPLANATION OF PLATES.

PLATE I.

Edwardsia Brillians. NEUM.

PLATE 2 AND 3.

WINTER FORMS,

EUROPEAN.

1. ***Bryoniæ*** (Alps) ♀
2. *Napi* (Germany) ♂

AMERICAN.

4. ***Bryoniæ*** (Newfoundland) ♀
5. ***Hulda*** (Alaska, &c.) ♀
6. ***Venosa*** (California) ♂
7. " " ♀
8. ***Oleracea hyemalis*** (New York) ♂
9. ***Borealis*** (Anticosti) ♂

SUMMER FORMS.

EUROPEAN.

3. *Napæa* ♀

AMERICAN.

10. ***Acadica*** (Newfoundland ♂
11. " " ♀
12. ***Pallida*** (Vancouver's Island) ♂
13. " " " ♀
14. ***Castoria*** (California) ♂
15. ***Oleracea æstiva*** (New York) ♂
16. " " " ♂
17. ***Virginiensis*** (Coalburgh, W. Va. ♀
18. " " " ♂

PLATE 4.

1. 1^a	*Ægeria*	***emphytiformis***	Walk.
2. 2^a	"	***pleciæformis***	"
3. 3^a	"	***odyneripennis***	"
4. 4^a	"	***hylotomiformis***	"
5. 5^a 5^b	"	***pyramidalis***	"
6. 6^a 6^b	"	***sapygæformis***	"
7. 7^a	"	***geliformis***	"

PAPILIO:

THE ORGAN OF THE
NEW YORK ENTOMOLOGICAL CLUB.

H S Jewett MD
Dayton Ohio

Devoted Exclusively to Lepidoptera.

VOLUME II.

EDITED BY
HENRY EDWARDS.

NEW YORK:
1882.

INDEX.

VOLUME 2.

INDEX TO AUTHORS AND SUBJECTS.

BOOK NOTICES.
- Butterflies: Their Structure, Changes and Life-History, by SAM'L H. SCUDDER 17
- New Check List of North American Moths, and Illustrated Essay on Noctuidæ, by A. R. GROTE 146

OBITUARY NOTICES.
- CHARLES R. DARWIN, F. R. S 81
- CHARLES G. SIEWERS 145

BAILEY, DR. JAMES S.
- Femoral Tufts or Pencils of Hair in certain Catocalæ 51

BEHR, DR. HERMAN H.
- On the Habits and Economy of Some Species of Sphingidæ 1
- Preparatory Stages of Seirarctia Clio, Pack 187

BRODIE, WM.
- Food Plants of Platysamia Cecropia 32
- " " Samia Columbia 79
- " " Telea Polyphemus 58

BUCKLER, WM.
- Some Points in the Natural History of Papilio Machaon, L. 85

CHAMBERS, VICTOR F.
- Tineidæ or Tineina 115

COLEMAN, N.
- Notes on Orgyia Leucostigma, Harv 164

COQUILLET, D. W.
- Life-History of Eustrotia Carneola 57
- On the Early Stages of Two Plume-Moths 61

EDWARDS, HENRY.
- Description of New Species of North American Heterocera 123
- Further Notes and Descriptions of North American Ægeriadæ, with Descriptions of New Forms 52
- On the Early Stages of Papilio Rutulus, Bdv 112

EDWARDS, WILLIAM H.

Descriptions of New Species of Diurnal Lepidoptera taken by Mr. H. K. Morrison at Fort Grant and Graham Mountains, Arizona, 1882.. 136
Descriptions of Butterflies Taken in Arizona by Jacob Doll, 1881.... 19
Descriptions of New Species ot Butterflies Found in the U. S....... 45
List of Species Taken in Arizona by Jacob Doll, 1881............... 28
On the American form of Papilio Machaon L...................... 74
~~Two New Species of Thanaos................................ .. 179~~

FRENCH, G. H.

Preparatory Stages of Arctia nais, Drury.......................... 176
" " Catocala cara, Guen........................ 167
" " Plusia biloba, Stph.......................... 113

GROTE, AUGUSTUS R.

Larvæ of North American Moths.............................. 99
New Arizona and Texan Moths... 131
Notes on Certain Geometridæ, with a New Byssodes from Florida.... 100
Notes Upon Catocala Snowiana, Gr., and Varieties in the Genus..... 8
On Certain Pyralidæ.. 82
On the Pterogostic and Other Characters of Eucaterva.......... 143
On Three Species of Euchœtes.................................. 110
Some New Noctuidæ and Notes...................... 183
Some Notes and Queries About Moths............... 170
The North American Species of Nonagria........................ 94
Two New Geometrids from Mr. Neumoegen's Collection............ 80

HAGEN, DR. H. A.

On Papilio Machaon, L. and its North American Representatives; Papilio Rutulus, Bdv.; and Parnassius; being Portions of a Preliminary Report on the Butterflies of Washington Territory.......... 149

ISHIKAWA, CHIYOMATSU.

Notes on Variations in Some Japanese Lepidoptera................. 35

JEWETT, DR. H. S.

Notes on Adelocephala Bicolor, Harris. 38
Some Additional Notes on Adelocepha Bicolor, with Description of a New Variety.. 144

NEUMOEGEN, BERTHOLD.

Description of New Hyperchiria from Arizona............ 60
Some New Beauties from Various Parts of Arizona.................. 133

OSBORN HERBERT.

Ægerian Parasites.. 71

OSTEN-SACKEN. BARON R. v.

List of Butterflies collected on the Pacific Coast, principally in California, in 1876, with Notes on their Localities and Habits......... 29

PACKARD, DR. A. S. jnr.

Notes on Lepidopterous Larvæ......... 180

PILATE, G. R.

A New Variety of Catocala................................ 31
List of Lepidoptera taken in and around Dayton, Ohio............ 65

RILEY, DR. C. V.

The Noctuidæ in the Missouri Entomological Reports.............. 41

STRETCH, RICHARD H.

Notes on Papilio Oregonia, Edw...................... 119
Notes on Pieris Menapia.......................... 103
What constitutes a species in the Genus Arctia? 90

WALSINGHAM, LORD.
  Tineidæ or Tineina 77
WEYENBERG, D. H.
  Nova Species Generis Ceratocampa 63

NOTES ON LEPIDOPTERA.

AKHURST, JNO.
  Erebus odora, L. on Long Island 18
BAILEY, J. S.
  Aletia argillacea in New York State 189
  Femoral Tufts 146
BALLARD, JULIA P.
  Adoneta spinuloides, Larva of 50
BEHRENS, JAMES.
  Coloradia Pandora 122
  Parnassius Smitheus in California 50
BOWDITCH, F. C.
  Honey for Sugaring 50
BRODIE, WILLIAM.
  Emergence of Bombycidæ 83
BRUCE, DAVID.
  Ceratocampa regalis at Sugar 188
  Cotton-worm Moth 62
  Moths and Butterflies of Monroe County, N. Y 188
  Notes from Monroe County, N. Y 81
CLARKSON, FREDK.
  Anisota senatoria, S. and A., Destruction by 188
COLEMAN, N.
  Larva of Pyrrharctia Isabella 18
  Melittia cucurbitæ, Harris 50
CRAMER, A. W. P.
  Hepialus gracilis, Gr. 34
  Rhodophora Florida, Gne 34
DOLL, JACOB.
  Zeuzera æsculi, L. in New Jersey 34
EDWARDS, HENRY.
  Dwarf Butterflies 34
  Fans on feet of Catocaline Moths 146
  Insect Pests in California 34
  Napthaline Cones 147
  Papilio Albanus, Feld 122
  Parnassius Thor., Hy. Edw 148
  Powerful Insecticide 34
  Swarming of Colias Philodice 34
EDWARDS. W. H.
  Papilio Polydamas in Florida 122
FERNALD, C. H.
  Xylina cinerea 63
GILBERT, H. ROY.
  Arctia Dione 50

GOODELL, L. W.
  Larva of Amorbia humerosana, Clem. 187
  New Localities for Butterflies 188
GREY, ROBERT.
  Early Appearance of Hyphantria 18
GROTE, ANNA.
  On Eugonia alniaria 148
GROTE, AUG. R.
  Egg of Hemileuca Yavapai, Neum 102
  Euedwardsia, new genus 122
  Fennaria sevorsa 189
  Note on the genus Herrichia 122
  On some Geometridæ from Dayton, Ohio 83
  On the Motion of the Wings in drying of Platysamia Cecropia 83
  Species of Pyralidæ omitted from the "New Check List" 148
HAGEN, H. A.
  Stretch's Bombycidæ of North America 188
HILL, W. W.
  Rare Noctuids 50
KIRBY, W. F.
  Fans on Forelegs of Catocala Fraxini, L. 84
MEAD, TH. L.
  Thecla læta 18
MORTON, EMILY L.
  Arctia nais 17
NEUMOEGEN, BERTHOLD.
  Emergence of Bombycidæ from pupa state 18
PACKARD A. S. jnr.
  Butterfly Parasites 84
  Probable Differences in two broods of Drasteria erecthea 147
RILEY, C. V.
  Xylina cinerea 101
SANDERS, JULIA E.
  Larvæ of Sphingidæ 147
STRETCH, RICHARD H.
  Alypia dipsaci, G. and R 181
  Callarctia ornata, Pack. 147
  Larva of Gnophæla Hopfferi, Gr 82
  Occurrence of Lepidoptera at Sea 82
WRIGHT, W. G.
  Early Butterflies in California 63

EDITORIAL NOTES.

Actias Luna in May 82
Bombycidæ of North America 50
Insect Enemies 18
Mr. A. R. Grote's Collection 82
Phycidæ of United States 148
Synopsis of Noctuidæ 50
Wing variation in Lepidoptera 18

GENERAL INDEX

VOLUME 2.

Acopa incana. n. s............ 128
Acronycta occidentalis, larva of.. 181
" populi.............. 43
Adelocephala bicolor........... 38
" " Trans. of... 38
" var. immaculata... 144
Adoneta spinuloides, Larva of.... 33
Ægeria asiliformis.............. 56
" candescens. n. s........ 123
" exitiosa, var. Fitchii..... 55
" Henshawii. n. s........ 56
" præstans. n. s......... 98
" prosopis. n. s.......... 99
" quercus. n. s.... 58
" quinquecaudata......... 56
" tecta.............. 56
" tipuliformis............ 56
" parasites of..... 71
Agrotis jaculifera............. 44
" messoria.............. 42
" repentis 42
Albuna denotata. n. s......... 55
Aletia argillacea............... 62
" " in New York... 189
Alypia dipsaci................. 101
Amblyscirtes Nanno. n. s.... .. 142
Amorbia humerosana, Larva of.. 187
Amphion nessus, Larva of...... 147
Anisota senatoria, Destruction by 188
" " Eggs of 189
Anthocaris Rosa. n. s......... 45
Antiblemma guttula. n. s...... 127
Apatura Leilia................. 23
Araschnia fallax.... 35
Arctia achaia, Variation of...... 91
" decorata, Larva of....... 179
" nais........... 18
" " Transformation of.... 176
" " Comp'd with phalerata 178
" variation in the genus.... 90
Argynnis Rabdia 36
Argyria auratella..... 73
Arta statalis........ 72
Artaxa, Diagnosis of genus..... 13
" ingenita. n. s......... 12
Asopia costalis............ 72
Azelina albomacularia. n. s.... 130
" Arizonaria. n. s....... 130
Azenia. n. g.................. 186
" implora. n. s......... 186
Bembecia marginata............ 52
Botis abdominalis.............. 73
" adipaloides.............. 73
" plectilis................ 72
Butterflies of New York State... 188
Byssodes obrussaria. n. s....... 101
Cacæcia roseana, Food Plant of. 182
California, Insect Pests of... ... 34
Callarctia ornata............... 147
Capis, the genus 185
" curvata 185
Catocala cara, Transformation of 167
" " Food Plant of.... 169
" concumbens, Fans on Feet of 51
" Desdemona. n. s..... 15
" Helene. n. var....... 31
" Snowiana............. 8
" Varieties of.......... 9
Cautethia Grotei. n. s......... 10
" " Position of..... 11
Ceratocampa regalis............ 188
" Vogleri. n. s..... 62
Check List of N. Amer. Moths... 146
Chloraspilates Arizonaria. n. s. 80
Cirrhobolina vulpina. n. var.... 14
Clisiocampa grisea. n. s....... 134
Colias philodice, Swarm of..... 34
Coloradia Pandora.... 122
Cotton-worm Moth...........62, 189
Cossula. n. g... 93
" magnifica. n. s....... 94
" " Habits of ... 94
" " Transfor. of. 94
Cossus Angrezi. n. s.......... 93
Crambus dissectus. n. s........ 73
" topiarius............. 74
Darwin, C. R., Death of........ 84
Dichelia sulphureana, Larva of.. 182
Dilophonota festa. n. s........ 12
Drasteria erecthea, Two Br'ds of. 147
Dwarf Butterflies 34
Early Butterflies in California... 83
Emergence of Bombycidæ......18,83
Endropia homuraria............ 100
" textrinaria.... 100
" vinulentaria 101
Epirrita dilutata................ 82
Erebus odora..................18, 82
Escaria. n. g................... 186
" clauda. n. s.......... 186
Eubolina Meskei. n. s.......... 128

Eucaterva. n. g. 80
" labesaria. n. var. 143
" Structure of 143
" variaria. n. s. 80
Euchætes abdominalis 111
" eglenensis 111
" inopinatus. n. s. 13
" perlevis. n. s. 131
" pudens. n. s 127
" Spraguei 111
" vivida. n. s. 131
" zonalis. n. s. 131
Eudamus Dorus. n. s. 140
" Epigena 141
" Hippalus. n. s. 27
" Moschus. n. s. 141
Euedwardsia. n. g. 122
Euherrichia. n. g. 122
Eulonche oblinita, Larva of. 99
Eustrotia carneola, Transfor. of. 57
" distincta. n. s. 184
" propera. n. s 132, 184
Fans on Forelegs of Catocala 51, 84, 106
Fatua. n. g. 97
" Proposed for Troc. denudatum 97
Femoral Tufts. 146
Fenaria. n. g. 132
" Changed to Phægarista. 189
" sevorsa. n. s 132
F'd Pl'ts of Platysamia Cecropia. 32
" " Samia Columbia 79
" " Telea Polyphemus .. 58
Gnophæla Hopfferi, Larva of 82
Grote Collection of Noctuidæ 82
Harmonia. n. g. 54
" Morrisonii. n. s. 55
Hemaris, Various Forms of. 171
Hemileuca Yavapai, Eggs of. 102
Hepialus gracilis 34
Herrichia, The Genus 122
Hypena Baltimoralis, Larva of. .. 181
Hyperchiria Pammina. n. s 60
" aurosea. n. var. 60
Hyphantria cunea 18
Hypoprepia inculta. n. s. 13
Hypopta Henrici. n. s. 131
Icthyura inornata. n. s. 134
Illustrated Essay on Noctuidæ .. 146
Illustrations of Noctuidæ 64
Insect Enemies 18
Japanese Lepidoptera 35
" " Figures of. 37
Lemonias Ares. n. s. 136
" Cleis. n. s. 137
Duryi. n. s. 45
Lepidoptera at Sea 82
Leptarctia lena, Variation of. 92
Leucophasia Amurensis 35
" Morsei 35
Limacodes rude. n. s. 12
" trigona. n. s. 12
Limenitis Arthemis. ab. C. 45
" Eros. 22
" Hulstii. n. s. 54
" Ursula. var. of 22
" Wiedemeyrii. aber. .. 22
Lycæna Anetta. n. s 45
Lycomorpha latercula. n. s. .. 124
" pholus, Larva of. 181
" rata. n. s. 124
Lygranthœcia constricta. n. s. . 128
" parmeliana. n. s. 14
Mamestra picta, Larva of. 97
Marmopteryx Seifertii. n. s. 134
" strigulata 81
Megathymus Neumoegeni n. s. . 25
" " Habit of. 28
Melipotis perlæta. n. s. 19
Melitæa perse. n. s. 136
Melittia amœna. n. s. 52
" cucurbitæ, Transform. of 50
" Snowii. n. s. 53
Metrea. n. g. 73
" ostreonalis. n. s 73
Napthaline cones 147
Nemophila petrosa, Variation of. 92
Neumoegenia. n. g. 132
" poetica. n. s. .132, 184
Nonagria enervata 95
" fodens 95
" inquinata 94
" læta 95
" oblonga. n. s. 96
" sub-flava, n. s. 95
Notodonta stragula, Larva of. 99
Œdemasia perangulata. n. s. 125
Ohio, Lepidoptera of 65
Orgyia leucostigma, Transfor. of. 164
Pamphila Arabus. n. s. 26
" Deva. n. s. 26
" Nereus 139
" Pittacus. n. s 138
" Python. n. s. 138
Papilio Albanus .... —
" Aliaska 74
" Asiatica 74, 152
" Cresphontes in N. Y. 188
" Dehanii 36
" Hippocrates 158
" Hospiton 154
" " Larva of. 155
" Jutanus 36

Papilio Machaon 74, 85
" " Attempt to Naturalize 76
" Machaon, Transfor. of..85, 97
" Oregonia ....~~119, 151~~
" " Larva of...120, 151
" Polydamas in Florida.... 122
" Rutulus................. 160
" " Compared with Turnus.................... 161
" Species of, in N. Y. State. 188
" Zolicaon.............74, 150
" " Compared with Oregonia..................... 150
Parasites of Lepidoptera......... 34
Parnassius in Washington Terr,. 164
" Thor.................. 144
Philampelus Achemon, Larva of. 147
" Pandorus, Larva of. 147
Phlegothontius celeus, Larva of.. 06
Pholisora Alpheus............... 139
" ceos. n. s.......... .. 140
Phycidæ of United States.. 148
Phyciodes picta 21
Pieris menapia.................. 103
" " Destruction by..... 104
" " Distribution of..... 103
" " Transformations of. 105
Plagiomimicus, The Genus...... 184
" expallidus. n. s. 185
Platysamia Cecropia, Food Pl't.. 32
" " Motion of Wings in Drying............. 83
Plusia accurata. n. s......... .. 127
" biloba, Transformation of. 113
" brassicæ :............... 43
" scapularis. n. s.......... 137
Powerful Insecticide.......... .. 34
Prodenia autumnalis............ 43
" commelinæ........ .. 43
Proserpinus Circæ. n. s........ 9
Prothymia plana. n. s......... 184
Pseudopsyche. n. g... 124
" exigua. n. s. .. 124
Pyralidæ Omitted from "Check List"...... 148
Pyrgus Nearchus. n. s......... 26
Pyrrharctia Isabella, Larva of. . 18
Pyrrhopyga Araxes............. 141
Pyrrhotænia Behrensii. n. s.... 123
Ragonot M. on Phycidæ........ 148
Rododipsa miniana, Figure of. .. 64
Rhodophora Florida............ 34
" " Larva of.... 34
Samia Columbia, Food Pl'ts of... 79
Scepsis fulvicollis............... 81
Schinea buxea, Figure of........ 64
Sciapteron admirandus. n. s.... 54
Seirarctia Clio, Transform. of ... 187
Selenia Kentaria................ 100
Siewers, C. G., Death of........ 145
Sospita. n. g................... 57
" Changed to Phemonoe.. 97
" quinquecaudata........ 97
Sphingipæ, California Species of. —
" Distribution of...... 173
" Doubtful Species of.. 172
" European and Asiatic 174
" Found at Sea......... 6
" Linnean Names of... 1
" N. Amer., Genera of. 175
" Relation to Plants... 4
" S. Amer. Genera of.. 174
" Synonomy of........ 170
Sphinx decolora. n. var........ 11
" Nerii, Larva of....... ... 5
" pinastri, Destruction by.. 3
" " Parasites of..... 3
Spragueia inorata. n. s......... 183
" magnifica. n. s...... 183
Stibadium aureolum. n. s...... 126
Stiria sulphurea. n. s.......... 135
Stretch's Bombycidæ of N. Am.. 188
Synedoida cervina. n. s......... 129
Tarache expolita. n. s.... ... 131
Telea Polyphemus, F'd Pl'ts of.. 58
Teras ferrugana, Larva of....... 182
Terias Damaris.................. 19
" Gundlachii 19
" Mexicana 19
Thanaos Clitus. n. s....... . . 180
" Tatius. n. s... 179
Thecla apama. n. s........... 137
" Clytie................. 24
" Ines. n. s.......... ... 25
" Itys. n. s............. 23
" læta 18
" Leda. n. s... 23
Thera contractata, F'd Plants of. 183
Thyreus Abbottii, Larva of...... 147
Tineidæ, Family Value of....77, 118
" Structure of 77, 118
Tortrix rosaceana, F'd Plant of.. 182
Trochilium caudatum........... 53
" denudatum 97
" gallivorum.......... 96
" syringæ........... .. 53
" tibiale............. 53
Walsingham, Lord, on Tineidæ.. 77
Wing Variation of Lepidoptera.. 18
Xanthoptera clausula. n. s..... 186
Xylina antennata............... 102
" cinerea...........43, 63, 101
" Grotei 102
Young Lepidopterist, A......... 148
Zeuzera æsculi............ 34

ERRATA.

Page 3, line 22, for "indviduals" read "individuals."
" 4, " 23, add "t" to the first word of the line.
" 6, " 31, for "courses" read "causes."
" 30, " 31, read "Grapta Silenus."
" 30, " 42, read "Argynnis."
" 30, " 43, read "Argynnis."
" 33, " 8, second column, for "Sambuscus" read "Sambucus."
" 35, " 17, for "Mentries" read "Menetries."
" 44, " 7, for "Danopolis" read "Demopolis."
" 44, " 29 and 31, for "synonym" read "synonomy."
" 54, " 37, read "as wide at base as the thorax."
" 66, " 57, first column, read "rare, one ♀."
" 71, " 1, first column, read "Heterophleps."
" 71, ' 14, first column, read "Deilinea."
" 93, " 47, read "was detected" for "were detected."
" 94, " 9, read "After the imagines emerge."
" 97, " 2, for "patustris" read "palustris."
" 97, " 43, for "seem" read "seems."
" 98, " 22, after "internal margin" add a comma.
" 98, " 29, for "Querci" read "Quercus."
" 99, " 30, for "oblinata" read "oblinita."
" 101, " 13, for "Cerussaria" read "obrussaria."
" 139, " 17, for "1 ♀" read "1 ♂."
" 161, " lines in foot note, the "o" displaced—last line read "Turnus."
" 164, " 38, for "Orgyvia" read "Orgyia."
" 186, " 23, for "semi-flarea" read "semi-flava."
" 188, " 12, for "photoliphography" read "photolitography."

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] January, 1882. [No. 1.

ON THE HABITS AND ECONOMY OF SOME SPECIES OF SPHINGIDÆ.

By Dr. Herman Behr, San Francisco.

The Sphinges are of those types that have attracted consider able attention even in the dawn of our science.

It is quite astonishing what a number of exotic Sphinges are figured in Cramer, Stoll and other ancient iconographs, and the very names given by the immortal Linné to the European species bear testimony how well their habits were known at the beginning of entomological study, because they refer either to the food plant of the larva, or to some peculiarity in its shape (*Porcellus*) and that is one of the strongest proofs of their having attracted the attention even of the non-scientists to a superstition the name of the fatal Goddess, *Atropos*, referring to the popular belief, that the appearance of this insect foreboded epidemics, famine or war. The name *Elpenor* is an allusion to the companion of Ulysses of that name, who met with a fatal accident when under the influence of wine. Linné evidently has chosen this name to indicate that the grapevine is the favorite food plant of the species. Nevertheless these powerful and active insects, whose peculiarities strike even the imagination of the common observer, do not play that part in the economy of nature that could be expected from their enormous locomotive powers, their spasmodic activity, and their formidable looking larvæ.

In fact, with very few exceptions their influence on other provinces of creation is limited, they rarely become injurious to vegetation and even then they are never an endemic pest, but only sweep a district like an epidemic not to reappear for more than a decennium.

The State of California as far as its fauna is known, is poor in Sphinges. Most of our species are too rare to play a part anywhere but in collections and cabinets of scientists.

Deilephila Lineata var. Daucus, is common throughout the State. It is also found in the Atlantic States and in the slightly aberrant form described by Linne, in Mediterranean Europe. It seems to be nowhere so common as on the Pacific slope. The larva prefers plants of the natural order *Onagraceæ*, viz: *Epilobium*, *Boisduvalia*, *Clarkiæ*, *Eucharidium*, *Godetia*, *Ænothera*, and since the introduction of the *Fuchsia* species into our gardens it has taken very kindly to the different varieties of these exotics.

The larva but rarely suffers here from *Ichneumon*, *Ophion* or other parasites. It has a strong vitality and the power to adapt itself to plants of different orders for instance *Rumex* and *Portulaca*. Occasionally, but rarely it is met with on the grapevine.

This species is known to have multiplied under favorable circumstances to an alarming extent. In a report published in the year 1877 I find a notice of such an instanee, of which I give the particulars.

In that year the neighborhood of Manhattan, in Kansas, was devastated by swarms of Locusts (*Caloptenus*) to a degree that all grass had entirely disappeared. Before the seeds of the destroyed grasses had a chance to germinate, their place was occupied by a herbaceous vegetation, chiefly consisting of *Portulaca oleracea*. Scarcely was this new vegetation started when numerous larvæ of *D. Lineata* made their appearance spreading even to some of the neighboring vineyards. This last circumstance roused the apprehensions of the people, when the cause of their fears disappeared as suddenly as it had made its appearance.

I read that *Philampelus Achæmon*, *Philampelus Satellitia*, and *Chærocampa Myron* are injurious to the grapevines of the Atlantic States. I do not know to what degree they are injurious, *i. e.* if they are dangerous, or merely troublesome and annoying.

Ph. Achæmon is the only one of these species as yet found in California. Like most insects, feeding on plants cultivated exclusively on large tracts of land, this species will multiply in favorable seasons to an alarming extent. Nevertheless, I do not know of any instance of material damage done by this species. The larva looks more formidable than it is in reality. It is of quick growth and soon transforms. The powerful flight of the imago carries the female to localities very distant from her birth place. Besides this, *Ph. Achæmon* partakes largely of the well known peculiarity of many Sphingides; namely, the undeveloped sexual character of the individuals that transform the same year and do not hybernate in the chrysalis state, so that the propagation depends mainly on the hybernating individuals.

From these circumstances it becomes evident that this species, although it may interfere to a certain extent with the production of a vineyard, is not capable of inflicting serious injury to the vines themselves, as is the case with endemic insect pests, or such epidemics as repeat more frequently.

I have no data as to what extent the injuries inflicted on vineyards by this species have been carried in the Atlantic States, nor am I in possession of exact statements in relation to *Ph. Satellitia* and *D. Myron.*

Macrosila Carolina and *M. quinque-maculata* occasionally injure tomato, potato or tobacco plantations. In California their destructions do not amount to much: in the Atlantic States, nevertheless, the damage done may be more serious. The insect seems to prefer tobacco to all other *Solanaceæ* and, therefore, in districts where a onesided agriculture excludes, to a considerable degree, cereals and fodder plants, the *Macrosila* species may develop up to insect pests. These pests probably will be of an epidemic, not an endemic character, as all Sphinges are rather unsteady in their quarters and of a nomadic turn. They generally crowd in one season and cannot be found in the next. Like *Ph. Achæmon* and its own near European relative, *M. convolvuli*, these species propagate only by the indviduals developed next summer, the numerous individuals developed the same season having their sexual organs imperfect and unfit for propagation.

I have read that *Ceratomia quadrieornis* infests the elm trees of the Atlantic States sufficiently to disfigure avenues, but I did not find any statement that these shade trees suffered permanently. As far as I know the European *Sph. Pinastri* is the only insect of this tribe that, in certain seasons, inflicts permanent injury to vegetation, but the scourge of this species appears in the same district only after a lapse of years, never in two consecutive years, but when it occurs, the destruction sometimes is as if a forest fire had swept the region.

A forest infested by the larva of *Sph. Pinastri* exhibits even to the unexperienced eye striking peculiarities. Upon entering the invaded district a peculiar acrid, but not exactly disagreeable, smell is perceived; the ear is struck by a grating monotonous sound, caused by the feeding of innumerable larvæ; on the ground crawl gaily colored larvæ on a layer formed of fallen leaves, tops of branchlets and the cubic excrements of the caterpillar, some trying to hide under ground for transformation, others to regain a tree and climb up the trunk, from whose top some accident had thrown them. Large sized *Ichneumons*, and *Ophiones*, minute but shining *Chalcides* bury themselves around the larvæ, while lazy *Tachinæ* wait for an opportunity to drop a few eggs on those which are nervously seeking to hide for transformation. The larva and parasite are persecuted alike by *Carabus auratus* and *Calosoma Sycophanta*, whose metallic bodies shine round the roots of the pines like golden coats of arms.

This entomological landscape is enlivened by villagers of all ages and sexes, under the command of some government forester, shaking trees, collecting caterpillars by broom and shovel into baskets and throwing them into fires kindled at different spots in the forest.

Modern forest culture has abandoned this system of warfare. Experience has shown that the *Pinastri* epidemic does not recur in the same district, even if nothing has been done. Science has demonstrated, that the enormous accumulation of parasitic *Hymenoptera* and *Diptera* would more than decimate the destructive insect without human aid. Besides this, insects, with enormous power of locomotion like *Sph. Pinastri*, never become endemic pests.

But the chief cause of a change in the forest tactics was the danger of fire, caused by the burning of the baskets amidst dry leaves, withered branches and dying pine trees.

Sphinx Pinastri is, as far as I know, the only *Sphinx* that occasionally causes serious damages, the harm done by the *Macrosilas* to cultivated *Solanaceæ* being scarcely worth mentioning.

If the Sphinges have but little power to harm vegetation, they nevertheless play an important part in their economy, for they are he carriers of pollen from flower to flower. Many of those flowers whose narrow tubular corolla contains anthers in a position that the pollen never could reach their own stigma nor that of a sister flower, are only fertilized by the interference of the *Sphinges.* The enormous length of the trunk of some of the *Macrosilas* is quite in proportion to the narrow, deep tube of the Tobacco flower and other *Solanaceæ* and *Apocynaceæ*, families not only patronized by the larvae, but also by the perfect *Sphinx*. And so it happens, that the precocious autumnal brood, whose imperfect sexual development prevents them from propagating their own species, contribute largely to the propagation of the plant that serves for food to the larvæ of their later born brethren and sisters. Looking for the nectar at the base of the cup they charge their trunks with the pollen and carrying in this way kisses from flower to flower, they are the means of fecundating the ovula, whose growth will serve as food for the offspring of their hybernating relatives.

There is a curious instance to be mentioned in regard to the mutual relation of some *Sphinges* and an *Asclepiadaceous* plant, the *Physianthus.* The pollen of all the *Asclepiadaceæ* being of a waxy, instead of a mealy substance, is not apt to be carried by the wind like the pollen of other plants nor is the position of the pollinea always such, that without interference of a third party, their contents can possibly reach the stigma. *Physianthus*, especially, is a genus, whose anthers are constructed on a plan that would impede communication between pollinia and stigma, and therewith fecundation and propagation of the species, if it were not for the agency of insects, and especially *Sphinges*, which, attracted by the copious nectar in the deep grooves that surround the tubus stamineus, insert their trunks into these cavities, where the narrow entrance is guarded by the anthers. There is a rim between the lower parts of the loculi of the anther, large enough to admit the trunk of a *Sphinx*, but gradually closing towards the upper portion of the loculi. This rim will catch the insect by its trunk and will keep it prisoner till the loculi have discharged their pollinia and fecundation has taken place. It is easily understood, that where the point of maturity, when the pollinia are discharged, is distant, the poor *Sphinx* has to choose between remaining prisoner for life or losing its trunk.

We may plant the *Physianthus* near tobacco plantations. Not that I think it of much practical use in protecting the plantation; it is merely to get even with a good number of *Macrosilæ* that have injured other tobacco plantations when in the larva state.

As to the object that nature had in view in this arrangement, I am at a loss to offer any explanation, if it is not the opinion, that nature sometimes is fond of very practical jokes.

Small and transitory as the influence of the *Sphinges* may be on the household of organic life, their scenic effect is considerable. And it is not only their size, elegance of form and harmony of colors; it is also their extraordinary powers of locomotion. A single specimen may enliven a flower garden in such a way that it creates the impression that the whole region was swarming with the species. Suddenly the insect will dart away like a humming bird, leaving the garden quiet and lonely, but repeating the same nervous activity on flowers in a different latitude.

It is a well known fact that the larvæ of *Ph. Nerii* are found nearly every year in different countries of northern Europe, where its food plant, *Nerium Oleander*, is cultivated in glass houses. Now those larvæ are brought there by females that are fecundated in a country where *Oleander* grows in the open air. The most northern place,* where the larvæ of *Nerii* has been found is St. Petersburg. It is more than possible that the female *Ph. Nerii*, that found her way into a Russian glass house, breakfasted on nectar of Oleander flowers on the borders of the Mediterranean.

And this is not an isolated occurrence. The very fact that the professional gardeners are wide awake to the financial advantages of having larvæ of this kind on their Oleanders, and that they do not kill them, but sell them, is the best proof of the frequently repeating occurrence. Some gardeners, induced by the prices paid by amateurs and collectors, have tried to cultivate *Ph. Nerii*, but all their efforts have been frustrated by the disinclination or disability of the specimens raised in northern climes to propagate. This is another proof of the frequency of such invasions, as each colony of larvæ is the product of an imigrated female, not of a female born in the northern region.

Modern investigations have also demonstrated that *Acherontia Atropos* and *Deilephila Celerio* do not propagate in Europe, and, consequently cannot be considered as indigenous species.

A French gentleman in San Francisco has shown me a little collection of insects, caught on board a vessel after a heavy gale, fifty-four geographic miles from the coast of Brazil. All these insects were *Sphinges.* They were ten in number; five *Macrosila Cingulata*, three *Philampelus Jussieuæ* and two specimens of a *Chærocampa.*

I could quote here a great many other instances that prove the wonderful powers of flight of these insects and their disposition to make use of them, but I consider the different facts mentioned here sufficient to demonstrate the impossibility to take measures against an invasion of such enemies. At the same time such measures, even if successful, would do very little good, because, in the few cases, where these insects inflict perceptible harm, the harm is but transitory, the enemy taking leave as abruptly as he appeared unexpectedly.

The advice to catch and kill the Sphinges hovering over flowers is as impracticable as to divert the course of a river by pailing. But if some people, not minding practical advantages, only wish to get even with the uninvited guests, let them plant *Physianthus*, and the torn off trunks sticking out of the flowers will satisfy the most revengeful disposition.

We would expect that the eminent power of flight in this group would produce a considerable number of cosmopolitan species, but there are comparatively but few. Two courses combine to restrict the majority to local distribution.

1. Their larvæ never are truly polyphagous. Most of them feed exclusively on a genus, many are even restricted to a single species whose geographical limits, of course, must comprise in that case the geographical limits of the *Sphinx.* The adaptability of their larvæ to the other kinds of food generally does not pass the limits of the botanical family, frequently, as mentioned above, does not extend even to species of the same genus. So *Deilephila Euphorbiæ* lives in quantities on *Euphorbia Esula*, rarely on *E. Cyparissias* and even in captivity it scarcely can be prevailed upon to feed on any other species and rather will die than touch most of the species of the Genus *Euphorbia.*

Its congener *D. Lineata* possesses of all the Sphinges known to me the greatest powers of adaptation. *Onagraceæ*, *Rubiaceæ* *Vitaceæ*, *Portulacaceæ* and *Polygonaceæ* will serve as food for its larva.

In consequence this species is to a considerable extent cosmopolitan. It is amphigeic, for it extends from California through America beyond the Atlantic into Mediterranean Europe and Asia, while *D. Euphorbiæ* is scarcely ever found beyond the limits of the most central part of Europe, but there in great numbers. In fact its habitat coincides with the habitat of *Euphorbia Esula.*

D. Galii adapts itself to plants of different families. It forms, therefore, part of the fauna of Europe, Asia and North America, and is, besides *D. Lineata*, the only instance of an amphigeic *Sphinx.*

D. Nicæa, Dahlii, Hippophaes, and *Vespertilio* are restricted in their food plants, consequently they are restricted in their habitat too.

Notwithstanding the roaming propensities of the individuals and their power to bear changes of temperature, the species themselves are strictly enclosed between certain isothermæ and isochimenæ, because the larvæ do not possess the same power of endurance in regard to climatic changes as the imago does. And this is perhaps the cause that all the immigrations of *Acherontia Atropos* before alluded to never succeeded in forming colonies.

Another peculiarity in the geograhical distribution of Sphinges may be derived from the same cause. The species of the Northern and of the Southern temperate zones are almost always distinct. Although these species invade the tropics from both sides, they never seem to be able to cross them so far as to reach the opposite temperate zone. The geographical distribution of some *Macrosila* and *Chaerocampa* is not a real exception, for their original home is the tropics, from whence they extend north and south. Perhaps some exception from this rule may be discovered in South Africa. The specimens of a so-called *M. Convolvuli*, which I have received from New Zealand, differ very materially from the European and North African insect and, are evidently the type of a new species.

As to the tropical species themselves, none of them are amphigeic. It may be, that in the course of time *M. quinquemaculata*, now beginning to form colonies on the Sandwich Islands, will reach the Australian continent, a feat that has been accomplished by one of our Diurnals (*Danais Archippus*).

The extratropical species of the Southern Hemisphere, at least so far as they are known, are distinct, each continent producing its own species.

NOTES UPON CATOCALA SNOWIANA

And Varieties in the Genus.

By A. R. Grote.

I have again carefully examined my type of this species. By the deep ochre yellow secondaries and the breadth of the mesial black band superiorly, I identify it as belonging to the Kansas form, hitherto regarded by me as a variety of our Eastern *Communis*, or of the Southern *Neogama* of Abbot and Smith. In the type, which is evidently an aberrant specimen, the fore wings are paler and appear somewhat aborted. This Kansas form, which must take the name *Snowiana*, differs by the forewings being diffusely shaded with black and wanting the brown subterminal space and greenish gray tint of the Eastern *Communis*. The mesial black band on the hind wings is broader above; the secondaries themselves are of an intense ochre yellow, darker than in the Southern *Neogama*. We then have three named forms which may be ultimately classed as varieties of *Neogama*. First the typical form from the South, of which a specimen collected by Belfrage in Texas, is in the collection before me. This has the hind wings and abdomen of a lighter yellow, the band as in the Northern form, the fore wings more gray than black, wanting the brown tints. Secondly the Northern and Eastern form, found from Canada to the Ohio River, described by Guenée as *Neògama*, but which, to distinguish it, I have called *Communis*. Thirdly the form above described from Kansas and which has perhaps a wider range. The question as to the value of these forms must be decided at a future date, when their complete history becomes known. It is, however, necessary, in order to discuss them intelligibly, that they bear different designations.

Since I first worked up the North American species of *Catocala*, a large number of species have been described and a great num- of varieties named. I briefly enumerate here the varieties named by myself so that there may be no doubt as to what I have intended by the names. I do so because this showy genus has, since 1872, been extensively written upon and there has been some misrepresentation with regard to the forms described by myself.

Var. *Simulatilis* of *Obscura*, has the median lines of the fore wings thick and distinct in both sexes, whereas, in the type, as figured, they are thread-like and partially illegible. Var. *Sinuosa* of *Coccinata* occurs in Florida; it differs from the typical form, described by myself, by the band on the hind wings being reduced to a sinuate, narrow, discal line or mark. Var. *Scintillans* is a well known and distinct form of *Innubens*, in which the fore wings are solidly brown to the subterminal line. Var.

Flavidalis of the same species has the hind wings yellow instead of orange. Var. *Bunkeri* of *Cerogama* has the median field of the primaries more or less suffused with brown, against which the white sub-reniform stands out in relief; the hind wings have the yellow band half narrower than in the type and the yellow base to the wing disappears. This variety is very beautiful in extreme examples and is named for Mr. Robt. Bunker of Rochester, who has devoted much attention to the species of this genus. Var. *Phalanga* of *Palæogama* is readily recognisable by the subterminal space being filled in with black contrasting with the white s. t. line; it is figured by me in the Proceedings of the Entomological Society of Philadelphia Vol. 3, Plate 3, fig. 1. Var. *Basalis* of *Habilis*, differs by the presence of a black basal streak on the primaries above. Var. *Westcottii* of *Anna*, differs by its smaller size and the black band of secondaries along the border being continuous and not interrupted as in the type before anal angle; the variety is from Illinois. Var. *Sordida* of *Gracilis*, differs from the type in having the primaries wholly of a dark hoary blue-gray; it has been collected by Dr. James S. Bailey in large numbers about Albany, N. Y., and is readily distinguished. Finally, var. *Lineella* of *Amica* differs by the darker shades on the forewings being gathered along the lines, giving the insect a distinct appearance, as compared with the type, while the ground color is powdered with greenish gray. This occurs with the typical form; in Texas another variety of *Amica* occurs in which the primaries are more or less suffused with black: Mr. Hy. Edwards calls this Var. *Nerissa*. Excluding *Communis* and *Snowiana*, as to the value of which I am doubtful, I have named ten varieties.

NEW SPECIES OF HETEROCERA.

By Henry Edwards.

FAM. SPHINGIDÆ.

Proserpinus Circæ. n. sp.

In form and outline of the wing very closely resembling the California species, *P. Clarkiæ. Bdv.* but abundantly distinct in color. The primaries are of a reddish olive tint, the basal space, and that behind the median band being the palest. The band is rich, deep olive brown, almost straight on its anterior edge, sinuous on its posterior, leaving the costal termination twice the width of that of the internal margin, and enclosing a rather darker ovate discal spot, shaded posteriorly with paler color. Secondaries dull chestnut red, with the base and margins darker than the centre of the wing, the basal shade being in the form of a band. There is no trace of a black band, as in *P.*

Gauræ. S. and A. Fringes fawn color, and the extreme marginal edge of the wing, dark brown, particularly at the anal angle. Beneath, the wings are wholly dull reddish, (inclining to chestnut) at their base, with pale central band, and margins again slightly darker. Pale shades of apex of primaries repeated. Head and thorax olivaceous. Abdomen reddish with olive tint, darkest towards the posterior extremities. Palpi whitish, as are also the base of the legs. The lower side of the abdomen has the segments narrowly edged with whitish.

Exp. wings. 40 m. m. Length of body 25. m. m.

Georgia. H. K. Morrison.

Types. Coll. B. Neumoegen. H. Strecker.

This is the species figured by Mr. H. Strecker in *Lepid. Rhop. et Heteroc.* as *P. gauræ. Sm. Abt.*, but it is certainly not that species, as it has no black band upon the secondaries so observable in *P. gauræ.* In the original description, Smith says of *P. gauræ*: "Alis dentatis; primoribus olivaceis dualis albidis puncto disci deltoideo; posticis ferrugineis striga pallida extremis nigris, margine albo." Now both the black band and the white margin are absent in the present species, the general color is much redder, and the wings less dentated, shorter than in the figure of *P. gauræ*, and of a different shape. *P. gauræ* more closely resembles *P. Juanita* of Strecker, in fact, the latter is *P. gauræ*, with the secondaries orange instead of rusty red, as in Sm. Abb. figure.

CAUTETHIA GROTEI. n. sp.

General color of primaries, brown black, with a grayish tint. Basal space blackish, enclosed by a double, indistinct, black line. Discal mark, velvety black. Posterior double line also black, the inner one bent forward very suddenly towards the costa, from the subcostal nervure, the outer one nearly straight for its costal half, and sharply dentate on the nervures. The submarginal line has a grayish white shade behind it, continuing to the edge of the wing, and there is also a blotch of the same color near the centre of the internal margin. Fringes alternately black and gray. Secondaries rich bright orange for the basal two thirds. Marginal band brown, moderate in width. Underside brownish, flecked with white scales, the base of secondaries dull orange along the abdominal margin. Thorax and abdomen grayish with black scales, the fifth and seventh segments banded with darker shades as in Macroglossa. Antennæ dusky black.

Exp. wings. 33. m. m. Length of body, 18. m. m.

Indian River. Florida.

Several examples, all constant to the description. This species has been confounded with *Cautethia* (*Œnosanda*) *noctuiformis. Walk.* and has been distributed by Mr. Neumoegen and myself under that name. It was also so quoted by Mr. Grote in his Sphingidæ of Cuba, a specimen of the present species being in the possession of Mr. Grote from that island. Mr. A. G. Butler, however, pointed out this error in PAPILIO, Vol. I. P. 105, and Mr. Grote, who has now seen Walker's type, thus writes from London under date of Dec. 3rd, 1881: "I have carefully examined the type of *Cautethia noctuiformis*. *Walker*. The specimen is unset, and smaller than ours from Florida; the forewings very similar, but the hind wings have the yellow only a patch at the base, and resting on the internal margin. The wider fuscous border extends also on costal region, and the yellow is paler." It cannot be but that we have here to deal with an entirely different species from that described by Walker, though it is somewhat extraordinary that so conspicuous an insect as the present should so long have escaped the observation of our Florida collectors. The genus *Cautethia* has been placed by both Butler and Grote near *Anceryx* and *Dilophonota*. This appears to me to be an error, its coloration, shape of wing, extremely long tongue, and tufted abdomen, bearing a closer resemblance to the *Macroglossinæ*. We know nothing, however, at present, of the early stages of this interesting group.

SPHINX (PROTOPARCE) CINGULATA. n. var. *decolora*.

A remarkable form, of which three examples are before me. In all of these, the rose-colored shade on the base of secondaries, and the sides of the abdomen, is entirely wanting. This is by no means owing to fading, or to the poor condition of the specimens, as two of them are absolutely fresh and perfect. In all other respects, the markings are identical with those of *S. Cingulata*. I can, therefore, only regard these examples as variations from the usual type. The species is of very wide distribution, having been found northward as far as Canada and southward as far as Brazil. It reaches also to the extreme west of the continent, and is very abundant in the Hawaian Islands. Have other observers noticed the extreme form now described?

Indian River. Florida.

Type. Coll. Hy. Edwards. B. Neumoegen.

DILOPHONOTA FESTA. n. sp.

Size of *D. obscura*. Head, smoky black on crown, mingled with grayish, with two white lines visible between the antennæ. Thorax blackish, mingled with gray—a double median line, and the tegulæ and space at base of the wings gray. Abdomen dull iron gray, with very faint blackish dorsal double line, enclosing a paler space. Sides and underside of both abdomen and thorax white, thickly interspersed with brown scales. Antennæ with the shaft white, the pectinations fawn color, and the tip pitchy-brown. Palpi, and the whole of the legs white, with brown scales. Primaries black, with a few gray scales intermixed, except on the apex and along the internal margin, where the gray predominates. The wings are deeply notched at the termination of the nervules, which are white and jet black, on a gray ground. Secondaries dull red, with whitish streak at base. The costal margin is also whitish. Apex shaded with dull black, continued around the margin to near the anal angle, where the usual mark of the genus occurs. In this species, it is a waved broad line of black and gray alternately, the gray line being double, the upper strongly toothed. The nervures are black as they approach the margin. Fringes gray, except on the abdominal margin, where they are clear white. Underside of wings, dull brick red at their base, brownish towards the extremities, the margin speckled with black and white, and the whole surface mottled with brown scales.

Exp. wings. 66 m. m. Length of body. 38 m. m.

N. W. Texas. J. Boll. Type. Coll. B. Neumoegen.

Allied to *D. melancholica*, but the wings and abdomen are blacker, the marginal band of secondaries less distinct, and the anal spot more gray in color.

FAM. BOMBYCIDÆ.

LIMACODES RUDE. n. sp.

Fawn color, with black irrorations. A submarginal stripe of darker color, (pale brown) parallel with the posterior margin, and an oblique stripe of same color reaching from the middle of the costa to near the base of internal margin, the space enclosed by these lines being rather darker than the rest of the wing. Secondaries and underside, without markings, except the black irrorations. Thorax and abdomen rather darker than the wings.

Exp. wings. 28 m. m. Length of body. 11 m. m.

1 ♂ "Maryland."

Type. Coll. H. Schönborn, Washington.

LIMACODES TRIGONA. n. sp.

Wholly pale fawn color, except at the base of the primaries, where is a clear white, rather large, almost rectangular spot, the edges of which are shaded with pale chestnut brown. The apex of the angle is directed towards the costal edge of the wing. There is also a trace of a darker shade on the apical portion of the posterior margin. Underside entirely pale fawn drab.

Exp. winds. 30 m. m. Length of body 14. m. m.

1 ♂ Prescott, Arizona. I. Doll.

Type. Coll. B. Neumoegen.

ARTAXA INGENITA. n. sp.

Primaries deep yellow, inclining to orange, but not very bright in tint. Secondaries two shades deeper in color. Thorax, abdomen and legs concolorous. Under side of rather a paler shade. There are absolutely no special markings upon any part of either surface.

Exp. of wings. 35 m. m. Length of body. 8 m. m.

1 ♂. Prescott, Arizona. I. Doll.

Type. Coll. B. Neumoegen.

Though probably forming the type of a new genus, I am safe in referring this very singular insect closely to Walker's genus *Artaxa*, hitherto only known from India and Australia. Should further investigation, and a knowledge of the earlier stages prove my present course to be wrong, I think it wisest, anyway, to place a new insect provisionally in a very closely allied genus, rather than create a new one, which extended inquiry may prove to be one already established. I append Walker's diagnosis of *Artaxa*, merely remarking that in the present species the only differences I can see are that the antennæ are shorter than in Walker's genus, and the spurs of the hind tibiæ are short, rather than long. In color, general structure and neuration, the species now described reminds one forcibly of the Australian *Artaxa chrysophila*.

" Genus 7. ARTAXA.

" Male and female. Body rather slender. Proboscis very "short. Palpi hairy, short; second joint very much longer than "the first, third joint conical, very minute. Legs slender; hind "tibia with four long spurs. Wings broad. Forewings with the "first, second and third inferior veins near together, fourth about "four times further from the third than the third is from the "second. Hind wings extending beyond the abdomen. Male. "Antennæ deeply pectinated. Female. Antennæ minutely pectinated." F. Walker.

Cat. Lepidopt. Heteroc. B. Mus.. Pt. 4, Page 795.

EUCHETES INOPINATUS. n. sp.

Primaries very pale fawn color, palest along the internal and posterior margins. Costa with buff dash at the base, above and below. Secondaries paler than the forewings, being almost a sordid white. The whole wings beneath are dull sordid white, without marks, except the buff dash at base of primaries. Head, base of fore tibiæ, fore coxæ, and upper side of abdomen buff, the latter with a row of small black dorsal spots. Tibiæ and tarsi, and under side of abdomen very pale fawn color.

Exp. wings. 27 m. m. Length of body. 11 m. m.

1 ♂. Indian River, Florida.

Type. Coll. Hy. Edwards.

FAM. LITHOSIDÆ.

HYPOPREPIA INCULTA. n. sp.

Primaries dull mouse color, with pale dash along the median nervule and a black streak above it, only visible with a lens. Head, thorax and fringe concolorous. Secondaries very pale silvery drab, with pink tinge, chiefly at the abdominal margin. Fringes mouse color. Abdomen drab, with the tip dull orange. Under side same as the upper, but slightly paler. The legs and antennæ are dull mouse color.

Exp. wings. 26 m. m. Length of body. 9 m. m.

1 ♂. Tucson, Arizona. I. Doll.
Type. Coll. B. Neumoegen.

FAM. NOCTUIDÆ.

LYGRANTHOECIA PARMELIANA. n. sp.

Primaries ochreous drab, with a slight greenish tint. Basal space clouded with olive brown. T. a, line narrowly edged with white, and deeply toothed outwardly on the median nervure. T. p. line also white, with a slight sinuation in the middle, where it is lost in a brownish cloud. The central space is the palest portion of the wing. It is crossed from costa to internal margin by a narrow olive brown cloud, obscuring the large reniform spot. Sub-reniform obsolete. Behind the t. p. line is a dark olive brown shade, the margins paler, with black dots at the end of the nervules. Secondaries dusky, with a paler discal shade, and the costa also pale. Fringes of both wings alternately stone color and brown. Beneath, the margins are broadly dusky, with dusky discal spots. Centre of both wings paler. Thorax and abdomen ochreous drab.

Exp. wings. 24 m. m. Length of body. 12 m. m.
1 ♂. "Maryland."
Type. Coll. H. Schönborn. Washington.

CIRRHOBOLINA MEXICANA. *Behr.* n. var. *vulpina.*

Similar in all respects to *C. incandescens*, *Grote* (—Syneda Mexicana, Behr.) except that the posterior half of the primaries is dull foxy-red, bearing at first sight the appearance of a new species. The marks of primaries and secondaries agree so closely with the form mentioned that I cannot regard the present as other than a variation.

3 ♀. Prescott, Arizona. I. Doll.
Types. Coll. B. Neumoegen.

MELIPOTIS PERLÆTA. n. sp.

Allied to *M. pallescens*, *G and R.*, but with the colors of the primaries in much stronger contrast. Basal space fawn color, dark brown as it touches the t. a. line and covered with brownish scales. Costa pinkish for its basal, and deep buff for its posterior half. T. a. line oblique, not dentated. T. p. line with slight sinuation in the centre, on which rests a brownish patch. The space between is bright buff, except on the costa, where there is a brownish triangular mark. Reniform and sub-reniform very faintly indicated. The pale discal shade, common to all the genus, is almost ovate in shape, with dark markings around it. There are some faint gray shadings towards the internal margin. The sub-marginal line is fawn color, slightly shaded anteriorly with brown. Fringe fawn color. Secondaries sordid white, with broad blackish marginal band, obsolete at anal angle, and with two white blotches in the extreme margin. Fringe white. Under side wholly clear white, with the costa of primaries pink, a broad marginal band and triangular discal spot dull black. Secondaries as on upper side. Thorax above, fawn color, with pinkish scales. Abdomen sordid white, with fawn-colored tint. Beneath, the thorax, abdomen and legs are clear white.

Exp. wings. 36 m. m. Length of body. 19 m. m.

Several examples.

Prescott, Arizona. I. Doll.

Type. Coll. B. Neumoegen.

CATOCALA DESDEMONA. n. sp.

Primaries rich wood-brown tint, with paler shades over the discal portion. The lines are all strong and well defined. Basal half line rich velvet black, slightly notched in the centre. Anterior line oblique, slightly dentate. It approaches the internal margin very close to the termination of the posterior line, which is very oblique from costa to second sub-costal nervure, where it forms a very long and sharp tooth. It then bends abruptly towards the lower end of the sub-reniform, where it is sinuato-dentate. The course is thence very abrupt to the internal margin. The reniform is brown, surrounded by a darker shade. Sub-reniform large, transversely ovate, paler, almost fawn-color, with brown and black scales. Across the posterior line is a fawn-colored shaded space, blending softly into the brown of the wing. The sub-marginal line is rather faint, and bears three black dashes from sub-costal to median nervule. Marginal lunules fawn color, with an orange tint. Fringes alternately fawn and brown. Secondaries rich orange, a little dusky along the abdominal margin. Median band widest in centre, nearly equal on its interior edge, and turning in a rather sharp hook to the abdominal margin. Sub-marginal band with four equal teeth about its middle on the exterior edge. It is nearly of equal width throughout, but becomes constricted near the anal angle, leaving an ovate patch joined to the main band by a narrow line. The inner edge of the band is without dentations. Fringe orange. Under side wholly rich bright orange, the primaries with median and sub-marginal band of black, the secondaries with the markings of the upper side repeated. All the fringes pale orange. Thorax concolorous with primaries, but with rather darker transverse band in front. Abdomen dusky orange.

Exp. wings. 62 m. m. Length of body. 25 m. m.

Four examples.

Prescott, Arizona. I. Doll.

Type. Coll. B. Neumoegen.

Probably nearer to *C. consors* than to any other species, but differing very widely in the markings of primaries, the median band of secondaries and the general color.

BOOK NOTICES.

BUTTERFLIES; THEIR STRUCTURE, CHANGES, AND LIFE HISTORIES, with special reference to American forms; being an application of the Doctrine of Descent to the study of Butterflies. With an Appendix of Practical Instructions, by SAMUEL H. SCUDDER. New York, Henry Holt & Co., 1881.

This book will be read by every Lepidopterist with mingled interest and disappointment; many highly important facts are given, and ingenious and probable deductions made from them; on the other hand, exploded fallacies are gravely used as proved facts, and from them necessarily erroneous general laws deduced. It is sufficient to mention the alleged fact that individuals of *Danaïs Archippus* develope and lay their eggs one after another for a year and a half, and to refer to the alleged parallel generations of *Argynnis Myrina* Mr. W. H. Edwards, years ago had shown the errors of observation and deduction involved in both of these cases, but here they appear in their original guise without note or comment.

Very few authors later than 1850 are quoted; the note on p. 204 fixes the date of the book as before 1877, when indeed the whole of it was delivered as a series of Lowell Lectures at Cambridge several years before 1877; however, different portions of this book had appeared in various magazines, as the story of *Myrina* in 1872, of *Archippus* in 1876 and other sections in 1877. This would be no disadvantage if the work had been properly revised with reference to the advances made in the last decade, but unfortunately this has not been done. The works of Weismann—since 1874 the best author on color pattern and seasonal dimorphism—are ignored, although twenty pages are devoted to the first of these subjects and nearly as many to the other. So are those of Paul Mayer—the only authority at present on the ancestry of insects—and *Hatscheck's Embryology of Lepidoptera* published several years ago, which singularly contradicts the statement on p. 10, that "very little is known * * of the formation of the embryonic caterpillar."

The drawings in the "Butterflies" are generally good, but some are very bad; for example the eggs of *Hypophlœas*, p. 7, *Philodice* and *Thoe*, p. 8. The latter looks something like a *Parnassius* egg, but in neither shape nor marking bears any resemblance to that of *C. Thoe*, which is very much flattened and studded with large starry projections. The drawings from Harris are inserted without any correction, or even mention of the very noticeable error which is pointed out in Harris' preface—the artist having provided four footed butterflies with a superfluous front pair of legs in thirteen instances. In spite of such matters of detail the work is valuable for any beginner bold enough to try to untangle such a Chinese puzzle as the author's nomenclature, which is entirely original and adopted by himself only, either here or abroad. As a reviewer in *Nature* points out, the recognized standard works of systematic nomenclature should be followed in a book intended for beginners and such innovations relegated to technical papers. The genera are those of Mr. Scudder's "Systematic Revision and were shown to be valueless by Messrs. Peabody and Mead in the *Canadian Etomologist*; if anyone cares for more information as to this matter, the last number of that journal (December 1881) may be referred to.

Particular attention is call to the introduction of English names as an improvement in the system of Linnæus. Open where you please and you meet such names as the Banded Purple, the Viceroy, the Monarch, the Blue-eyed Grayling, The Tiger Swallow-tail, etc., and usually without reference in the text by which the student may know what insect is meant, though this information may be obtained by reference to a glossary in the appendix.

Let us analyze one of the expressions, for example the Red Spotted Purple. *Basilarchia Astyanax*, meaning *Limenitis Ursula*. In the first place it is not red-spotted, in the next place it is not purple, in the next place there is no such genus as *Basilarchia*, and in the last place *Astyanax* is a resurrected name unknown for a hundred years until recently disinterred by Mr. Scudder. The author speaks of "a continuous stream of Blue-eyed Graylings, p. 1, referring to *Satyrus Alope* called by Mr. Scudder *Cercyonis Alope*, and classed under the Meadow Browns in the appendix. In the text he calls it a Grayling, but as the color is not gray. why not a Brownling? and moreover a Grayling is a fish, (*vide* Izaak Walton), and the name must be regarded as preoccupied in ichthyology. We find *Xanthidia Nicippe*, the Black-bordered Yellow. The butterfly is orange not yellow, and the name might apply to *Colias Philodice* but not *Nicippe;* it is a misfit. *Philodice*, however, appears as the Clouded Sulphur, though it is not clouded, and on one page (189), this is called the Sulphur Yellow, creating perplexity. Indeed these instances and the reference on p. 287 to the FireWeed as having a blue flower, suggests that the author may have perceptions of color different from those which are usually considered the normal standard. Besides this misapprehension there is a constant effort to deduce general principles from too few facts, or even supposed facts; for example, the philosophical discussion upon the alleged fact that caterpillars in hatching, always devour their egg-shells; in point of fact they frequently leave the shells almost intact. So with the incorrect statement that albino females of *C. Philodice* never appear in the first brood of the season, illustrating the law given by the author that "since melanism is a southern and albinism a Northern peculiarity, we should anticipate melanism in the hot and albinism in the cool season." Another instance is shown in the assumption that the polymorphic forms of *Lycaena Pseudargiolus* must be related as are the polymorphic forms of *Papilio Ajax*, and the philosophical discussions following this assumption.

The Appendix of practical instructions is admirable, and will be read with interest and profit by both the tyro and the specialist.

If the demerits of the book have been more touched upon than they merit it is because we all know that we may expect good results from Mr. Scudder, and the shortcomings of his work need to be pointed out all the more on that very account.

GENERAL NOTES, RARE CAPTURES, ETC.

Under this head we shall publish, from time to time, such notes with reference to Lepidoptera as we deem may be useful to our readers, and we ask for contributions to what we think may ultimately prove a valuable column of "PAPILIO."

Early appearance of Hyphantria Cunea.—A very fine example of this species was taken February 10, 1881, at White Plains, N. Y.—ROBERT GREY.

Erebus odora.—An example of this fine moth ♀, was captured at Parkville, L. I., on June 16th, 1880.—JOHN AKHURST.

Insect enemies.—Prof. I. H. Comstock, of Ithaca, N. Y., is preparing a report on the "Insect Enemies of Orchards and Gardens," and will be grateful to any Lepidopterists, or others, for information of destruction which may have come under their notice. The life-history of all species will be given as far as possible.

Thecla læta.—A fine example of this species, one of the rarest of our North American Lycænidæ. was taken by me in July last, at Coalburgh, West Virginia. I believe that only about five other examples are known to collections.—THEO. L. MEAD.

Arctia nais.—This species and its variations, including *A. decorata*, has been extremely abundant during the past summer at Newburgh, N. Y., the insects coming freely to light. A few examples of the much rarer *A. persephone* have been taken under the same conditions.—EMILY E. MORTON.

Wing variation of Lepidoptera.—Mr. A. H. Swinton, of Guildford, England, is preparing a somewhat elaborate work upon this subject, which will probably be published early in the spring.—HY. EDWARDS.

Emergence of Species from the Pupa State.—It is well known to breeders of Lepidoptera that various species emerge from the pupa condition at different hours of the day. The following facts which have come under my observation may be of interest:

Attacus Atlas......	emerges	about	7 A. M.
Actias Luna........	"	"	4 P. M.
" Selene.......	"	"	5 P. M.
Platysamia Ceanothi.	"	"	4 P. M.
" Gloveri..	"	"	4 P. M.
" Cecropia.	"	"	5 P. M.

I hope soon to be able to give more extended observations to the subject.—B. NEUMOEGEN.

Larva of Pyrrharctia Isabella.—When first hatched the larvæ of this fine moth are black, but after the second moulting one red ring appears, and one more at each successive moulting till the normal number is reached, after which no more moultings occur. The order of occurrence, as far as noticed, is one forward, then one back of the one that first makes its appearance. Sometimes there are only two segments with two red tufts on each; occasionally only three red tufts in all on the back of the larvæ. One form, with dirty brick-red tufts on four segments produces what seems to be a variety of this moth, it being lighter colored and the black spots are differently situated. In one case the abdominal portion of the body was quite dark colored; in others, the body was of the color of the wing, with the usual black spots.—N. COLEMAN, Berlin, Conn.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] February, 1882. [No. 2

DESCRIPTION OF SPECIES OF BUTTERFLIES TAKEN IN ARIZONA BY JACOB DOLL, 1881.

BY W. H. EDWARDS.

TERIAS GUNDLACHIA. *Poey*, Hist. Nat. de la Isla de Cuba, p. 246, plate 24, figs, 1 and 3.

Several examples of this fine species were taken in southern Arizona, in October. It is at once distinguishable from other orange species by the triangular prolongation of hind wing opposite cell. The male is deep orange, the female paler; the former has a broad, black costal border to primaries, and this extends down hind margin nearly to inner angle, gradually narrowing. The female has a narrow border next base, but broad at apex. Under side of primaries pale orange; of secondaries rather whitish, with fine streaks and dusting of ferruginous; beyond the disk a zigzag brown stripe from costal to inner margin, macular beyond cell. In the female wholly macular.

I formerly received a male of this species from the late Mr. Boll, taken in Texas.

TERIAS MEXICANA. *Boisd.* Morris, p. 36.

This species appears to be common in southern Arizona, and there is much variation in the extent of the black border on secondaries.

Mexicana has occasionally been taken in the Mississippi valley, and Mr. A. W. Hoffmeister reports it at Fort Madison, Lee Co., Iowa.

TERIAS DAMARIS. *Felder*, ♀ Reise Novara, p. 198, no. 100.

Male.—Expands 1.3 inch.

Shape of T *Mexicana*, Bois.; much smaller, the hind wings produced to an angle on second median nervule, as in that species; color of upper side uniform lemon-yellow; a few black atoms along costal edge of primaries, but the bases of both wings are quite free from black; a broad black border along the hind margins; on primaries this presents a deep, broad, sub-quadrangular sinus, covering the two median interspaces; the base of the sinus is uneven, with a further small excavation in the border; above the sinus the inner edge makes obliquely and with wavy outline for costa, which it strikes at about two-fifths the distance from apex to base; the border of secondaries has a projecting tooth opposite cell.

Under side of both wings paler, more white, but the cell and costa of primaries decidedly yellow; a slight sprinkling of dark scales along costal edge, and the ends of the nervules to apex are dotted black; also towards apex and on upper half of hind margin there is a little ferruginous along the edges; on upper end of arc of cell a black dot.

Secondaries have a little cluster of ferruginous scales on costa; a dash of ferruginous, with scales behind it, from outer angle half across wing, and in line a mark of same color in lower median interspace; on costal edge a few dots, and one on upper end of arc. This description applies to two males taken by Mr. Doll, but the third differs somewhat; the basal half of secondaries is lightly flecked with ferruginous streaks; in the lower median and in the sub-median interspaces, close to the nervule, and in the line of the ferruginous dash, are two little black points, and half way between the dash and hind margin are two points not so black; one in each of the two upper median interspaces; the ferruginous scales behind the dash are more densely laid on, and over a larger area than in the other males; otherwise, on both surfaces, this example resembles the other two.

Female.—Same size.

Color of primaries whitish, but yellow next base and over cell to costa; secondaries all yellow, but paler than male; both margins at base dusted black; the border as in male, with a similar sinus. Secondaries have no border, but the nervules at outer angle are edged black, next to margin; discal spot of primaries obsolete.

Under side of primaries nearly as upper, but deeper yellow at base and on cell; costa and apex dusted ferruginous; the discal spot distinct.

Secondaries wholly dusted with ferruginous; the marks as in male.

From 2 ♂ 1 ♀, taken in southern Arizona. I have also one male, formerly received from the Wheeler expedition. The description of the female answers very well to Felder's. No male seems to have been hitherto described, though Kirby, in Catalogue, gives ♂ *Damaris* as synonym of *Mexicana* ♀ Bois. Spec. Gen. 655. I have carefully compared that description with *Damaris* ♀ and it is not possible that the two are identical. Nor is *Damaris* same as *Depuiseti*, Bois., Lep. Guatemala, p. 11, as Kirby states. Boisduval says the marginal border of primaries in *Depuiseti* is deeper than in *Mexicana*, also that the anterior border of secondaries is largely of a fine citron-yellow. Now, the whole of both wings of ♂ *Damaris* is citron-yellow, and the marginal border is not deeper than in *Damaris*. *Mexicana* differs much in its markings, shape of sinus, etc., and no doubt, *Damaris* varies considerably also.

PHYCIODES PICTA.

Melitæa Picta, ♂ Edw., Pr. Ent. Soc. Phila., 3, 201.

Canace ♂ Edw., Tr. A. E. Soc., 3, 206.

MALE.—Expands 1.1 inch.

Upper side black with fulvous and whitish or buff spots or bands, very much as in *Pratensis*, Behr; or fulvous and buff with very little black, there being much variation. In the lighter examples, the angular discal band on primaries is yellow-buff, and the fulvous spots of the next outer band are partly replaced by buff; the submarginal lunules are of same color, and there is a buff band across cell; on secondaries the mesial band is partly buff. So much buff with the fulvous gives these examples quite a gay appearance.

Under side of primaries mottled with pale yellow, or yellow-buff, fulvous and black, the apical third being yellow or buff; with same color the costal margin is broadly edged; there are patches of fulvous in and below cell, and in the median interspaces, the intervening ground being yellow or buff; at inner angle is a black patch, another at origin of lower median nervule, and below same; a curved band beyond cell and a wedge-shaped patch between this and apex. Secondaries yellow or yellow-buff, nearly immaculate. Some examples have two small patches of brown on hind margin, a cluster of brown scales at outer angle, and one or two dots near the arc; also two or three dots corresponding with the pupils of the extra-discal row of fulvous spots of upper side. Other examples have these last dots, one or two streaks between them and hind margin, and a few dots on costal margin.

FEMALE.—Expands 1.3 inch.

Upper side as in male, except that on secondaries the fulvous bands are diffused, and the black areas between them reduced to little more than lines; the fulvous is of uniform shade also, and in the discal band it is not replaced by yellow as in the male. Under side of primaries as in the male; secondaries yellow, with faint reticulated brown lines on basal area, extending a little beyond the middle of the wing; along hind margin a series of narrow brown crenations, and above these a series of small brown spots or points. By the uniform clear yellow, or buff, of hind wings and of much of primaries, *Picta* is easily distinguished from other western species.

Since seeing the many examples of *Picta* in Mr. Neumoegen's collection I am satisfied that P. *Canace* is identical. It was originally described from a ♂ received from Arizona, while *Picta* was described from several males brought by the late Mr. Ridings from Nebraska. The northern examples are darker, but all, whether from Nebraska, New Mexico or Arizona, agree in the coloration of under side. Mr. Chas. Dury informs me that he found *Picta* abundant in New Mexico, on his recent visit.

LIMENITIS URSULA. *Fabr.*

Var. *Arizonensis.*

Differs from the type in that the primaries are much produced; so also are the secondaries, the band at upper branch of median being much more angulated. The green extra-discal area is broken into spots by the black borders of all the nervules; the marginal spots on primaries are restricted to a single series, corresponding to the inner row on *Ursula* type, there being no trace of sub-marginal markings; these spots, also, are not lunular, but are small, and on upper half of wing scarcely more than points. Secondaries have two rows along margin, the outer small, lunular, the inner rounded, except the three posterior, which are lunular, but all are smaller than in *Ursula*,

The under side is more like *Ursula*, there being on both wings a double series of lunular spots, but the inner one is decidedly white on secondaries; there is also an absence of the white found in *Ursula* about apex and on middle of costa of primaries.

Several males were taken about Tucson, and later in the season, in southern Arizona. I formerly received four ♂ of this variety from the north of Arizona, taken by the Wheeler expedition. There is a gradual departure from the white-banded form *Proserpina* (co-form of *Arthemis*) of northern New York, first into the type seen in southern New York, and Pennsylvania to Chicago, with occasonal traces of the band, then into the typical *Ursula*, wholly free from the band, as found in Virginia, then this southwestern form, in which the shape of the wings alters and the markings have somewhat changed.

So far no females have been taken.

LIMENITIS WEIDEMEYERII. *Edw.*

aber. sine-fascia.

This extraordinary example lacks the broad, common white band on both surfaces, also the white patch in cell of primaries; all the sub-marginal and apical spots are present and as in the type.

Taken near Tucson.

LIMENITIS EROS. *Edw.*

var. obsoleta.

Color faded, very like Danais *Strigosa*, Bates, but with the characteristic white spots of *Eros*, on the inner side of the black mesial band of secondaries, and on both surfaces.

1 ♂ 1 ♀ taken in southern Arizona, in October.

APATURA LEILIA. *Edw.* But. N. A. Vol. 2. ♂.

Female.—Expands 2.25 inch.

Upper side ferruginous-brown, lighter than the male; the apical spots of primaries pure white, as are also the three at end of cell, but those in the median interspaces are yellowish (in male white); three black ocelli as in male. Under side as in male, the base and posterior half of primaries being castaneous, the rest, and all of secondaries, pearl-gray upon a brown sub-color; the space in cell of primaries between the two dark spots gray-white (in male white); the ocelli on both wings repeated, enlarged, with yellow rings, and in centre clusters of blue scales.

A large number of both sexes were taken in southern Arizona, in October. The male was described from three examples brought in by the Wheeler expedition.

THECLA ITYS. n. s.

Male.—Expands 1.3 inch.

Upper side brown; primaries have smooth oval sexual spot on disk; secondaries have a few scales of fulvous in lower median interspace near margin and a whitish edge to margin between tail and angle; tail single, of median length, tapering, black, with white fringe on posterior side and at tip; fringes of wings fuscous next margins, sordid-white outside, between tail and angle long, whitish, the ends of the hairs there black.

Under side light gray-brown; primaries have a sub-marginal row of obsolescent spots, and an extra discal row of small rounded black spots, the one on sub-median interspace not always present; each spot edged with white; on the arc a faint brown streak. Secondaries have a complete sub-marginal row of black points, or small clusters of scales, on whitish ground; at anal angle a velvet-black patch, over which are a few orange scales and then black; in next interspace is a bluish spot, with black scales above; and in lower median interspace a small orange spot with black above and below; across disk a row of small round black spots in white rings; a brown streak on the arc.

Body above brown; beneath, thorax gray-white, abdomen yellow-white; legs gray; palpi white; antennæ ringed, black and white; club black, the tip ferruginous.

Female.—Expands 1.3 inch.

Upper side same color as male; a small clear fulvous spot near margin. In one example there is a second tail, very short, black with white tip. In another this tail is wanting. Under side as in male, but the discal spots are a little larger, as also is the orange spot on secondaries, and the next three black spots anterior to this have yellow scales on lower side.

From 1 ♂ 2 ♀ taken at Prescott.

The species belongs to the *Acadica* group

THECLA LEDA. n. s.

Male.—Expands .85 inch.

Upper side pale black, along inner margin of primaries and base, and inner half of secondaries, violet-blue; on primaries a dark, rough stigma; secondaries have two tails, the anterior one short, the other long, both black with white tips; a dark patch at anal angle, and two in the next adjoining interspaces on the margin.

Under side gray-brown; both wings edged by a brown line, next which the scales are whiter than elsewhere, giving the appearance of a second line, white; primaries have an obscure submarginal series of brown lunules, an extra-discal, somewhat macular, band covering whole wing, brown, with no scales, and edged without by white, at the end of cell a brown bar, with red scales and white on either side. Secondaries have a clouded marginal border, indistinct brown lunules running through a whitish ground; a black anal patch, over which is a red edging, red also on the inner margin, just above; a rounded red spot, with black at the margin, between the two lower branches of median; across the disk a macular band from margin to margin, bent at a double angle, or W, below median, brown, much covered with red, and edged outside by white; an obscure streak at end of cell, and a brown and red bar above cell half way between the band and base.

Body above fuscous, the abdomen whitish, with orange scales; under side of thorax and abdomen white; legs brown and white; palpi white, brown above and at tip; antennæ fuscous, narrowly ringed with white; club black, fulvous at tip.

From 2 ♂ taken near Prescott.

This pretty species is allied to *Clytie*, Edw., described from a single female, in Field and Forest, Vol 3, page 232, 1877, and at first view I thought these Arizona examples were the males of that species. *Clytie* was taken by Mr. Boll at San Antonio. Secondaries are wholly light blue, color of Lycaena *Pseudargiolus*, and so are the inner margins of primaries, whereas *Leda* is violet-blue; the under side is marked with red as in *Leda*, but more heavily. Both wings are edged by a red line, and hence it differs from *Leda*. So the outer tail is white, and the other black, partly fringed on one side by white, whereas in *Leda* both are black, with only the extreme tip white. The abdomen of each is white, but *Leda* has much orange on upper side. So that the two forms are distinct, though of same sub-group.

I take the opportunity to reprint the description of Thecla *Clytie*, as Field and Forest is no longer published, and the volumes are not readily accessible.

THECLA CLYTIE. Field and Forest, 111, p. 88 1877.

Female.—Expands .8 inch.

Upper side of primaries blackish, except on the inner margin up to cell, where the color is light blue, forming a pretty regular arc of a circle, terminating at three-fourths the distance from base to inner angle. Secondaries wholly light blue, color of Lycaena *Pseudargiolus*, pale next outer angle and along inner margin; hind margin edged by a black line, preceded by a white one, and on that, towards outer angle, is a narrow fuscous edging; some small patches of fuscous also near inner angle along same line; in lower median interspace is a marginal black, rounded spot, and at inner angle, an orange spot; furnished with two tails, the outer one short, white; the inner one very long, threadlike, black, partly fringed on one side by white, white at tip; fringes of primaries fuscous, of secondaries white, not pure but a little gray, and at the ends of the middle nervules darker than elsewhere.

Under side gray-white, pale on disks, and darkest on hind margins; both wings are edged by a fine red line, and are crossed a little beyond the middle by a common series of elongated red spots edged with white; this series on primaries stops at lower branch of median, and on inner margin of secondaries takes the form of W; discal spot of primaries a long, red bar; on secondaries there is a small red spot on costal margin near base, and two smaller ones in line with it on middle of basal area; primaries have also a sub-marginal row of pale fuscous, sub-lunate spots, and the marginal area of secondaries is clouded with light and dark, not forming distinct spots; between the tails a black triangle upon a large orange spot, and at the angle a black spot overtopped by orange; the under side of the tail is also red next the margin.

Body above black, covered with blue hairs, the abdomen white; beneath wholly pure white; legs white, annulated broadly with black on outer sides; palpi white; antennæ annulated black and white; club tipped with ferruginous.

From 1 ♀ taken at San Antonio, Texas. So far as I know this specimen is still unique.

THECLA INES. n. s.

Male.—Expands .80 to .85 inch.

Upper side wholly lavender-blue, except the apical area of primaries, which is brown-black; secondaries have a rounded black marginal spot between the tails and an indistinct spot next anal angle; the posterior tail is long, and both are slender, black, tipped white; fringes sordid-white next the margin, brown at ends.

Under side of both wings cinereous, lightest colored over extra-discal part of secondaries. Under a glass the scales are seen to be alternately gray and brown, but on secondaries, beyond disk, the gray scales prevail, and this area is clouded, light and dark; primaries have a sub-marginal line of pale brown lunules; an extra-discal, nearly straight black stripe, edged on the outer side by white; a straight black bar on arc; secondaries have an irregular black line across disk, forming a W near inner margin; on the arc a black streak; a brown patch at inner angle and a faint spot between the tails.

Body above blue, on abdomen mixed with brown; beneath, thorax cinereous, abdomen lighter; legs gray and black; antennæ annulated black and white; club black, tip ferruginous.

Female.—Expands about 1 inch.

Rather more than half of primaries is black, the blue being restricted to posterior part, and not reaching inner angle; the blue is also a shade darker than in male; secondaries blue, except on the costal margin, which is black. Under side as in the male, but in the mesial band of secondaries ferruginous scales appear.

From a large number of examples taken in southern Arizona, in October.

This species belongs to same group with *Leda* and *Clytie*.

COPÆODES MYRTIS. n. s.

Male.—Expands .8 inch.

Upper side bright red-fulvous; hind margin of primaries bordered by pale brown, narrowly next inner angle, widening above and at apex; the nervules brown at extremities; costal edge brown; at outer end of cell an indistinct dark mark; secondaries have a narrow brown border from outer angle to lower median nervule; the inner margin narrowly and the costal margin broadly edged brown.

Under side of primaries brown, yellowish at tip; from base to near inner angle a black stripe; color of secondaries wholly yellowish.

From 1 ♂ taken near Tucson.

PAMPHILA ARABUS. n. s.

Male.—Expands 1.3 inch.

Upper side glossy dark brown; primaries have three small spots on costal margin in straight transverse line, and two oblique to them in median interspaces, all translucent; a whitish point in sub-median interspace in line with the two spots, and a similar point in cell near outer end; fringes brown.

Under side of primaries brown, the hind margin, from apex, two-thirds distance to inner angle, clouded dark gray; secondaries gray-brown, shading into brown on middle of disk, and slightly gray again along hind margin; the brown area lies on middle of disk and to costal margin. Body, above dark brown, below gray; legs light brown; palpi whity-brown; antennæ, black above, yellowish below; club black, tip ferruginous.

From 1 ♀ taken in southern Arizona, in October.

PYRGUS NEARCHUS. n. s.

Male.—Expands 1.2 inch.

Upper side brown-black, over basal areas blue-gray; primaries have a row of white points, and an incomplete sub-marginal row, only distinct next inner margin; on costal margin, three-fourths the distance from base to apex, are four white spots in transverse line; outside these, near hind margin, a double spot, and in upper median interspace, beneath the costal line, a single spot; across both wings a broad white mesial band; secondaries have a marginal row of small spots, and a row of sub-marginal lunules on posterior half of the wing; fringes alternately white and black.

Under side of primaries pale greenish-brown, the spots and band repeated, the former confluent and enlarged; costal margin whitish: secondaries clouded, greenish-brown and sordid-white, the band not clearly defined; inner margin white. Thorax and abdomen above blue-gray, below, thorax white, abdomen pale-brown; legs buff-white; palpi white; antennæ black above, whitish below; club black, whitish below.

From 4 ♂ taken in southern Arizona, in October.

EUDAMUS HIPPALUS. n. s.

Male.—Expands 1.6 inch.

Upper side glossy-brown; primaries have, at three-fourths the distance from base to apex, four minute, whitish, semi-transparent spots on costal margin, three of them in perpendicular line, the fourth a little outside; a similar spot in lower discoidal interspace, a small rectangular spot in upper median and a large rhomboid in lower median interspace; these three in an oblique line; a bar across cell just over the rhomboid, and above cell a dash nearly parallel to costal edge; fringes of primaries alternately fuscous and dull white, the dark shade prevailing at apex, of secondaries white with short brown hairs at the ends of the nervules, but which do not entirely cross the white.

Under side brown, much dusted with gray scales, especially over secondaries and at apex of primaries; inner margin of primaries yellowish; secondaries crossed by two dark bands, one on disk, the other beyond; there is also a demi-band near base; the spots of primaries repeated and a little enlarged, and in addition there is a light brown patch lying between the outer spots and opposite cell.

Body brown above, beneath, thorax gray-brown, abdomen whitish, with a brown line on venter; legs gray-brown, the inside of tibiæ white; palpi white with brown hairs; antennæ black above, annulated with yellow beneath; club black above, yellow beneath, and above also, at base, tip ferruginous.

From 2 ♂ taken at Tucson and at Prescott.

The species is near *Cellus*, Bois.

MEGATHYMUS NEUMOEGENI. n. s.

Male.—Expands 2 inches.

Upper side black and orange-fulvous; costal margin brown; along the hind margin of both wings a broad black band, erose within and opposite cell on primaries incised; on costal margin, beyond cell, a black patch which extends to median nervure, and there connects with a larger patch which occupies most of the disk; between this and the border a broad, orange-fulvous band from margin to margin, but restricted opposite cell; on costa a fulvous patch anterior to the black one; the basal area darker fulvous.

Secondaries have the disk black, much concealed by long fulvous hairs, and between this and the border a light band as on primaries; fringes alternately fuscous and sordid-white, white prevailing on posterior half of secondaries.

Under side of primaries dark brown at base and on posterior half of wing quite to hind margin, the apex densely sprinkled with gray-white scales; the orange band repeated, but above median replaced by white; the patch on costa repeated.

Secondaries brown, wholly sprinkled with gray-white scales, most densely beyond disk, and this area is somewhat clouded; a small white spot near base below sub-costal, otherwise immaculate.

Body brown; beneath, thorax gray-white, shading towards abdomen into gray-brown; legs reddish-brown, with many gray scales and hairs; palpi white; antennæ brown above, whitish below; club, black above, whitish below, tip dark ferruginous.

Female.—Expands 2.2 inches.

Less black, more orange fulvous; the borders as in the male; in one example the black patches are nearly as in the male, but in the other they are greatly reduced. In this last one, on under side of primàries, the orange band is broad and bifid, embracing the costal patch; secondaries, in addition to the white spot near base, have a white patch, a cluster of white scales, denser than elsewhere, near inner angle.

From 1 ♂ 2 ♀ taken in southern Arizona. Another ♀ was taken, making four examples. They are described as sitting in the sunlight, on leaves of Agave, and flying when disturbed to the adjoining cliffs of rocks, alighting generally out of reach of the net. I take pleasure in naming this species for Mr. B. Neumoegen, whose zeal has led him to send a special agent, these two seasons, to explore New Mexico and Arizona for lepidoptera. By great sacrifices rich results fortunately have been attained, as was fitting. In the *Heterocera,* particularly, numbers of new and rare species have been taken.

LIST OF SPECIES OF BUTTERFLIES TAKEN IN ARIZONA BY JACOB DOLL, 1881.

Papilio Daunus	Bois.
" Philenor	Linn.
Pieris Protodice	Bois.
Terias Nicippe	Cram.
" Gundlachi	Poey.
" Mexicana	Bois.
" Damaris	Felder.
" Lisa	Bois
Danais Berenice	Cram.
" Strigosa	Bates.
Geirocheilus Tritonia	Edw.
Satyrus Meadii	"
Libythea Bachmanni	Kirtl.
Apodemia Mormo	Feld.
" Nais	Edw.
" Palmeri	"
Charis Australis	"
Thecla, Leda	"
" Ines	"
" Itys	"

Melitæa Dymas	Edw.
" Bollii	"
" Minuta	"
Phyciodes Pratensis	Behr.
" Marcia	Edw.
" Picta	"
Eresia Texana	"
Synchloe Adjutrix	Scud.
" Crocale	Edw.
Grapta Satyrus	"
Junonia Lavinia	Cram.
Limenitis Ursula	Fab.
v. Arizonensis	Edw.
" Weidermeyerii	"
" aberr. sine-fascia	
" Eros	"
v. obsoleta	"
Heterochroa Californica	Butler.
Apatura Leilia	Edw.
Neonympha Rubricata	"
" Henshawi	"
Lycaena Alce	"
" Fea	"
" Marina	Reak.
Copaeodes Procris	Edw.
" Myrtis	"
Pamphila Taxiles	"
" Comma v. Juba	Scud.
" Ottoe	Edw.
" Rhesus	"
" Uncas	"
" Arabus	"
" Eufala	"
Amblyscirtes Aenus	"
" Simius	"
Pyrgus Nearchus	"
" Tessellata	Scud.
Systasea Zampa	Edw.
Pholisora Catullus	Cram.
" Pirus	Edw.
Eudamus Hippalus	"
Megathymus Neumoegeni	"

30–60 *species in all.*

LIST OF BUTTERFLIES COLLECTED ON THE PACIFIC COAST, PRINCIPALLY IN CALIFORNIA, IN 1876, WITH NOTES ON THEIR LOCALITIES AND HABITS.

By R. von Osten Sacken.

Papilio Daunus. *Bdv.* Yosemite, June 12; Ogden Cañon, Utah, August 2.

Papilio Rutulus. *Bdv.* Los Angeles, about the end of February; San Bernardino, March 15; San Rafael, (Marin Co.,) Geysers, (Sonoma Co.,) very common in April and May; Yosemite Valley, June.

Papilio Eurymedon. *Bdv.* Marin Co., April; Geysers, Sonoma Co., May 5. On road from Clarks to Big Trees, Mariposa Co., about 5000 feet altitude, June 3; Yosemite, June 9.

Papilio Zolicaon. *Bdv.* Marin Co., early in May; Webber Lake, at an altitude of about 8000 feet, July 24. This species appears to be fond of flying on the tops of hills. I saw it in such positions in Marin Co., as well as at Webber Lake, and at Lake Tahoe. The latter is about 6200 feet altitude.

Papilio Philenor. *L.* Very fine examples in Marin Co., in April and May. In San Rafael the caterpillars went into chrysalis about the end of June.

Parnassius Clodius. *Men.* Webber Lake, Sierra Co., July, quite common.

Parnassius Smintheus. *Dby.* Georgetown, Colorado, 8500 feet altitude. Rare and rather worn, August 12.

Pieris Venosa. *Scud.* Very common in Marin Co., from the end of March to the beginning of May.

PIERIS CASTORIA. *Reakt.* San Rafael, etc.; May 10.

ANTHOCARIS AUSONIEDES. *Bdv.* Sonoma Co.; April 27.

ANTHOCARIS HYANTIS. *Edw.* Geysers, Sonoma Co., May 5; Yosemite, June 13.

ANTHOCARIS REAKIRTII. *Edw.* On sea shore, Sta. Barbara, February 6; San Bernardino, March 12; Marin Co., end of April and beginning of May. Not rare.

MEGANOSTOMA EURYDICE. *Bdv.* Lagunitas, Marin Co., April 15.

COLIAS EURYTHEME. *Bdv.* Yosemite Valley, June 11; Lake Tahoe, 6200 feet, July 19.

COLIAS KEEWAYDIN. *Edw.* Common in Marin and Sonoma Counties, end of April; Yosemite, June 5.

COLIAS MEADII. *Edw.* Foot of Gray's Park, Colorado. Altitude 12,500 feet; August.

PYRAMEIS ATALANTA. *L.* Marin and Contra Costa Counties; July.

PYRAMEIS CARDUI. *L.* Sta. Barbara, January 25; common. Los Angeles, March; Webber Lake, July 29; Fort Bridges, August 7; Cheyenne, August 21.

PYRAMEIS CARYÆ. *Hbn.* San Bernardino, March 12. Small and worn. Marin Co., April 1; Webber Lake, July 27.

VANESSA CALIFORNICA. *Bdv.* Marin Co., April 15; Lake Tahoe, July 19. Very dark specimens.

VANESSA ANTIOPA. *L.* Yosemite, June 12. Common. Lake Tahoe, July 19; Humboldt station, Nevada, July 29, very large. Fort Bridger, Wyom., August 7.

JUNONIA COENIA. *Bdv.* Yosemite, June 9; Summit Station, Sierra Nevada, 7000 feet, July 17.

GRAPTA SATYRUS. *Edw.* Marin Co., April 2.

GRAPTA SILENNS. *Edw.* Lagunitas Creek, Marin Co., April 15.

LIMENITIS LORQUINI. *Bdv.* Marin and Sonoma Cos., May 10–30. Common. Yosemite, June 14; Webber Lake, July 17.

LIMENITIS CALIFORNICA. *Butl.* Marin Co., with the preceding but much less common, May; Yosemite, June 9.

LIMENITIS WEIDEMEYERII. *Edw.* Ogden, Utah, August 2; Fort Bridger, August 7; Manitou, Colorado, August 18.

LIMENITIS MISIPPUS. *Godt.* Fort Bridger, Wyom., August 27. Not rare.

ARGYNNIS MONTICOLA. *Behr.* Lake Tahoe, July 19. Common.

ARGYNNIS CORONIS. *Behr.* Ogden Cañon, Utah, August 12.

ARGINNIS LETO. *Behr.* With the preceding.

ARGINNIS EURYNOME. *Edw.* Fort Bridger, Wyom., August 12.

ARGYNNIS EPITHORE. *Bdv.* In the coast range, among the Redwoods, (Sequoia sempervirens,) between Sta. Clara and Sta. Cruz. Quite common, May 22.

MELITÆA CHALCEDON. *Bdv.* Emerged from chrysalis in Los Angeles, March 16. Common around San Francisco in May; Yosemite, June.

MELITÆA EDITHA. *Bdv.* Crafton's, near San Bernardino, March 12. (Determined by Dr. H. Behr).

MELITÆA PALLA. *Bdv.* Marin and Sonoma Cos., April and May; Yosemite, June.

MELITÆA NUBIGENA. *Behr.* Between Glacier Point and Snow's, Yosemite Valley. Altitude about 7000 feet. Very common on July 10.

PHYCIODES MYLITTA. *Edw.* San Rafael, July 17.

PHYCIODES PRATENSIS. *Behr.* Marin Co., April. Common.

The species captured before July 15 were determined by Mr. Henry Edwards, those taken after that date, by Mr. Sam'l H. Scudder. One exception is noted.

A NEW VARIETY OF CATOCALA

By G. R. PILATE, Dayton, Ohio.

CATOCALA CLINTONII.—*Grote.* Var. *Helene.* n. var.

In order that my description may be better understood, I will make it in comparison with *Clintonii.*

Expanse 2 inches.

It is exactly the same size and shape of Messrs. Grote and Strecker's figures of *Clintonii*; and of two specimens, ♂ and ♀, in my own collections.

Thorax *darker* than in *Clintonii*, and more speckled with black.

The thorax and collar are of an uniform color, while in some five or six examples of *Clintonii* that I have seen, the color is brownish, tipped with a well defined black line, below which is a white or grayish one. Abdomen a little more brownish, than in *Clintonii.* Upper surface; primaries *much darker*, especially in the middle area, than in *Clintonii;* and covered with blackish specks; basal line well marked; t. a. line a little more distinct than in *Clintonii*, and differently shaped; in *Clintonii*, starting from the costa, it makes a long sharp tooth *posteriorly*, and then curves inwardly to the black basal dash; while in *Helene* the tooth is small and points *anteriorly;* the line curves irregularly across the cell, where it forms another tooth pointing anteriorly: from there to the base it is similar to *Clintonii;* t. p. line also differs from *Clintonii;* the two teeth are unequal and *blunt;* the second one being very small, and rounded at the point; while in *Clintonii* they are both large, *sharp* and of nearly equal length; from the teeth the line is undulating and continues down to the base of the wing, without showing the long black sinus, which occurs in *Clintonii;* the sub-marginal line is whitish in color;

between it and the t. p. line is a brownish shade; the marginal line is without dentations, and not scalloped as in *Clintonii;* sub-marginal space streaked with black along veins 1 and 2, but not on veins 6 and 7 as in *Clintonii;* the median shade is very heavy and extends from the costa to the lower anterior border of the reniform; the reniform is brown, bordered posteriorly with white, and anteriorly by the median shade; sub-reniform hardly visible. Black basal dash of *Clintonii* totally wanting. Secondaries; the median band is not *contracted* near the centre, as in *Clintonii;* the marginal band is very nearly *twice* as wide as that of *Clintonii*, and the separation near the anal-angle not so well marked as in Mr. Strecker's figure, or in the examples of *Clintonii* that I have seen; but not *entirely* connected, as in Mr. Grote's figure, Pro. Ent. Soc. of Phil., vol. 3, plate 3, fig. 4; the marginal yellow spot shows but slightly; the fringe is not as deep as in *Clintonii*, and is much darker. Under surface; bands all much wider than in *Clintonii*, and consequently giving it a much darker appearence; the marginal band not showing the separation. This var. is described from one ♀ taken at sugar, June 18th, 1880. I took a ♂ and ♀ *Clintonii* the same evening, and another ♂ the following evening; those being the first and and last of that species taken in this locality. Though differing *considerably* from *Clintonii*, I am satisfied it is only a var. of that species. I sent my type of *Helene* to Mr. Hy. Edwards last winter, and he said he had never seen one like it, and did not know what it was. On the strength of his assertion, I have named and described it.

During the past season I took two specimens of Catocala *Robinsoni*, var. *Curvata*. French; both of them were ♀.

FOOD PLANTS OF PLATYSAMIA CECROPIA.

[From papers read before the Natural History Society of Toronto, Dec., 1880, and Dec 1881, by Wm. Brodie.]

The following list is compiled from researches made in the County of York, Ontario, during the last 17 years.

The finding of a cocoon on a plant is not held to be conclusive that the larva fed on that plant; all such cases, when unsupported by other evidence, have been rejected.

The plants are held to be such as a perfect female Cecropia, at liberty, will select as food for her young.

The list is, no doubt, quite imperfect, and in a few years will be largely supplemented:

ORDER. TILIACEÆ.

Tilia Americana, Linn.
“ *Europœa*, Linn.

ORDER. ACERACEÆ.

Acer spicatum, Sam.
“ *saccharinum*, Warz.
“ *dasycarpum*, Ehr.
“ *rubrum*, Linn.
Negundo aceroides, Moen.

ORDER. ROSACEÆ.

Prunus Americana, Marsh.
“ *domestica*, Linn.
“ *Pennsylvanica*, Soi.
“ *Virginiana*, D. C.
“ *Serotina*, D. C.
“ *vulgaris*, Linn.
Spirœa opulifolia, Linn.
“ *salicifolia*. Linn.
“ *tomentosa*, Linn.
Cratægus coccinea, Linn.
“ *tomentosa*, Linn.
“ *Crux-galli*, Linn.
Pyrus Malus, Linn.
“ *communis*, Linn.
“ *coronaria*, Linn.
“ *arbutifolia*, Linn.
“ *Americana*, D. C.
Amelanchier Canadensis, Lorr. and Gr.

ORDER. GROSSULACEÆ.

Ribes Floridum, Linn.
“ *var. officinale*, Linn.
“ *rubrum,var.officinale*,Linn.

ORDER. CAPRIFOLIACEÆ.

Sambuscus Canadensis, Linn.
“ *pubens*, Michx.

ORDER. ULMACEÆ.

Ulmus, Americana, Linn.
“ *racemosa*, Thom.
“ *fulva*, Michx.

ORDER. CUPULIFERÆ.

Quercus alba, Linn.
Fagus ferruginea, Ait.
Corylus Americana, Walt.
“ *rostrata*, Ait.
Carpinus Americana, Michx.

ORDER. BETULACEÆ.

Betula alba, Linn.
“ *excelsa*, Ait.
“ *lenta*, Linn.
Alnus incana, Willd.
“ *serrulata*, Ait.

ORDER. SALICACEÆ.

Salix humilis, Mar.
“ *lucida*, Muhl.
“ *viminalis*, Linn.
“ *alba*, Linn.
Populus tremuloides, Michx.
“ *balsamifera*, Linn.

It will be seen that this species has been observed to feed on 49 specimens of plants, which belong to no less than 20 genera, and 9 Natural orders. I hope soon to be able to give the result of my observations upon other species of *Bombycidæ*.

NOTES ON LEPIDOPTERA.

ZEUZERA ÆSCULI L.—A fine example of this well-known European species was taken in a spider's web in Hoboken, N. J., in June last, by Mr. Schmitz. It was alive, and was endeavoring to escape from the web. The specimen is now in the collection of Mr. B. Neumoegen.—JACOB DOLL.

A POWERFUL INSECTICIDE.—The Department of Agriculture, at Washington, has just issued a circular with reference to *Pyrethrum roseum*, claiming that this plant is highly destructive to Insect life. It would appear likely to become of great service in preserving cabinet specimens from insect pests.—EDITOR.

SWARMING OF COLIAS PHILODICE.—In August last, on the White Plains R. R., near Scarsdale, I observed, settling on the track of the railway, for a space extending over a mile, immense swarms of this species. Their number can only be expressed by "myriads." When disturbed they flew up in clouds, settling again very quickly at a little distance. They were nearly all ♂♂, my estimate at the time being that there was about 1 ♀ in 500 examples. I could see no noteworthy variation in the many specimens captured, save a trifling occasional difference in the width of the marginal band. All the specimens seemed fresh, and in good condition.—EDITOR.

BUTTERFLY PARASITES.—An admirable paper has just been published by Dr. A. S. Packard, Jr., in the Proc. Bost. Soc. Nat. History, in which the author describes 22 species of *Ichneumonidæ*, known to be parasitic on our butterflies. The forms mentioned belong to 10 genera, viz.: *Ophion*, *Campoplex*, *Trogon*, *Ichneumon*, *Microgaster*, *Pteromalus*, *Encyrtus*, *Eulophus*, *Entedon*, *Trichogramma*. The descriptions are made with Dr. Packard's usual care.—EDITOR.

HEPIALUS GRACILIS, GRT.—In August, 1880, I took, in one day, about twenty imagos, sitting against the trunks of trees, in a cemetery of St. John, N. B. A. W. PUTMAN CRAMER.

RHODOPHORA FLORIDA, GUEN.—On July 17, 1881, I found these beautiful noctuids, in the middle of the day, sitting in the flowers of *Oenothera biennis*. L. The colors of the insect being almost identical with those of the half-closed flowers, made it very hard to distinguish them. On the 7th of August I found, in the same spot, the young larvæ feeding on the interior of the seed pods; their heads and half their bodies being inside, while the rest of their body protruded outside through a hole, gnawed in the side of the pod. Altogether I found seventy larvæ in a small spot in Central Park, and a few near Flushing, L. I.—A. W. PUTMAN CRAMER.

INSECT PESTS IN CALIFORNIA.—From the Report of the California Fruit-Growers' Association (S. Francisco, 1882), we learn that the Codlin Moth (*Carpocapsa pomonella*), is causing a great deal of damage in the orchards of the State. It appears, from the address of President C. H. Dwinelle, that this destructive species was unknown west of the Rocky Mountains until 1873, in which year it was introduced among some fruits sent from the eastern side of the continent to the State Fair, at Sacramento. The insect has spread with such rapidity that now few parts of the State may be said to be free from its attacks. In the Report there is also an allusion to two other species of Lepidotpera, said to occasion damage, viz.: *Clisiocampa Americana* and *Orgyia leucostigma*. These, however, are wrong determinations, neither of the species being found on the Pacific Coast. The insects referred to are probably *Clisiocampa Californica*, Pack., and *Orgyia vetusta*, Bdv.—EDITOR.

DWARF BUTTERFLIES.—Among some insects recently received by Mr. J. Akhurst, from the Upper Amazon, were several examples of the well-known tropical species, *Gynecia Dirce*, L. and *GonepteryxLeachiana*, Godt., which are little more than one-half of the usual size.—EDITOR.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] March, 1882. [No. 3

NOTES ON VARIATIONS IN SOME JAPANESE LEPIDOPTERA.

By CHARLES ISHIKAWA, University of Tokio, Japan.

Having had a summer's tour in the southern extremities of Hokkaido, I caught a few species of butterflies which are more or less interesting, as they present peculiar local variations in comparison with those found on the main island. These species are:

1. ARASCHNIA FALLAX. *O. Janson.*

This species is common in the northern part of the main island, abounding in the mountainous districts. A species very much allied to this was found by Mr. Fenton in the shady wood near Sapporo, Hokkaido, and described by him under the name of *A. Obscura.*

2. LEUCOPHASIA AMURENSIS,. *Méuétriès.*

The representative of this species (figures 1, 2) was found in Hokkaido, with rounder wings and paler apical patch. (Figs. 3, 4.)

Mr. Fenton has kindly described this species for me as follows:

LEUCOPHASIA MORSEI. *Fenton.*

Allied to L. Amurensis, *Ménétriès.*

Wings rounder; not produced at the apex; the black apical patch, lighter.

Average expanse of

L. Amurensis, ♂, 1" 11½'''; ♀, 2" 0⅓'''.
L. Morsei, ♂, 1" 11''; ♀, 2" 0''.

Together with the roundness of the wing in the Hokkaido species, it will be seen that the fourth and the fifth subcostal veinlets are shorter than those of *L. Amurensis*, showing thus either the rounding of the wing had taken place in *L. Morsei* or the reverse had occurred in *L. Amurensis*, which changes depend entirely upon the original place of the species.

In Figs. 5 and 6 I have traced out the outline of the wings comparatively, the dotted line showing the Hokkaido species *L. Morsei*, and the plain line that of the main island. Fig. 5 shows the comparative outline of the male wings, and Fig. 6 of the female. Figs. 7 and 8 show the comparative outline of the male and female insects; Fig. 7 showing the outline of *L. Morsei* and Fig. 8 that of *L. Amurensis*; the dotted line shows the ♂ and the plain line the ♀.

3. ARGYNNIS RABDIA. *Butler.* Fig. 9.

The Hokkaido representative of this species has its wings slightly rounded, Fig. 10; the inner deep brown borders of the median band between the costal vein and the first subcostal veinlet straight, and the outer borders of the same bent inward, the reverse taking place in the species of the main island. Many other differences occur between these species, which are, however, not constant.

In Fig. 11 the outline of the primaries of the male specimens are compared, and in Fig. 12 that of the secondaries, together with the borders of the band. The dotted line in both figures show the Hokkaido species and the plain line the species of the main island.

4. PAPILIO JUTANUS. *Fenton.*

This species occurs not only in Hokkaido, but also in the mountains of the main island. Its ally, *P. Dehaani*, Felder,is common round Tokio and northward (principally), becoming scarcer as we go up in Hokkaido, while *P. Jutanus* becomes more and more numerous, until near Sapporo we entirely lose sight of *P. Dehaani.*

These two species or varieties, as Mr. Fenton doubts, differ from each other both in the form of wings and in their markings. In *P. Jutanus* the outer edges of the primaries are slightly scalloped, (Figs. 13 and 14, 13 showing the male wings and 14 the female). The submarginal band of the green atoms of the primaries is more distinct and narrower; a band of yellow atoms a little beyond the middle of the secondaries below, wholly absent in *P. Dehaani.*

I must add that the majority of the facts in this note were made by Mr. M. A. Fenton, and were handed to me in the year 1878, after our summer's trip to that island, Mr. Fenton giving me the liberty of communicating them at the meeting of the Biological Society at Tokio.

I will not venture to draw any conclusions from these simple observations, but I trust that they may be of interest to the readers of PAPILIO.

VARIATIONS IN JAPANESE LEPIDOPTERA.

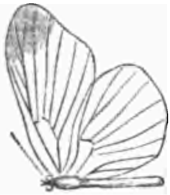


Fig. 1.

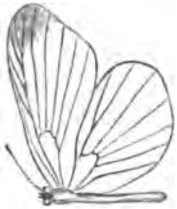


Fig. 2.

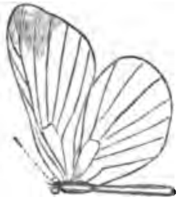


Fig. 3.

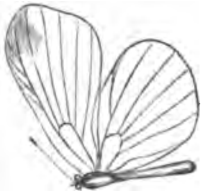


Fig. 4.

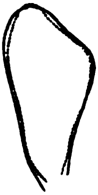


Fig. 5.

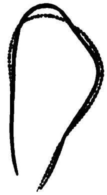


Fig. 6.

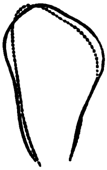


Fig. 7.

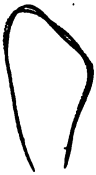


Fig. 8.

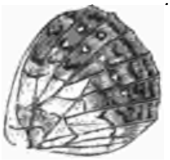


Fig. 9.

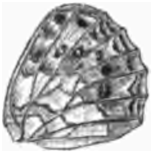


Fig. 10.

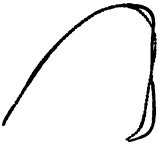


Fig. 11.

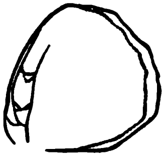


Fig. 12.

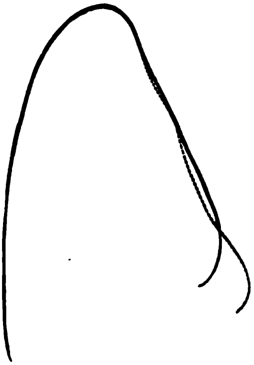


Fig. 13.

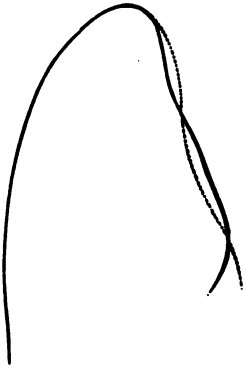


Fig. 14.

NOTES ON ADELOCEPHALA BICOLOR, HARRIS.

BY H. S. JEWETT, M. D., Dayton, O.

In the following description, the *dorsal line* is the line running along the centre of the back. The *stigmatal line* is the line passing through the spiracles. The *sub-dorsal line* is the line mid way between the dorsal and stigmatal lines. The *dorsum* is the space extending on each side of the dorsal line to the sub-dorsal lines. The *sub-dorsal space* is the space between the sub-dorsal and stigmatal lines. The *stigmatal space* is the space between the base of the legs and stigmatal line. The *venter* is the under surface of the larva.

The eggs are smooth, pale-green, oval disks one-twentieth inch in longer, one-twenty-fourth inch in shorter, diameter and one-thirty-second inch thick. As they approach maturity they become biconcave and change to yellowish-brown in color. From thirty-six to forty-eight hours before hatching, a dark brown spot (the head of the larva which lies coiled around the edge of the disk-shaped eggs) becomes visible through the translucent shell.

Eggs deposited May 26 hatched on May 31. Larvæ one-eighth inch long, pale green. Head very dark glossy brown (nearly black); sub-quadrate, bilobed, with a number of minute stiff black hairs scattered over it. Each segment, from the first to eleventh, inclusive, has three (3) conical tubercles on each side of the dorsal line; one on the sub-dorsal line, another just below it, and the third just below the stigmatal line. Each of these tubercles gives rise to a short black hair. The second and third segments, in addition to these tubercles, have (on each side of the dorsal line) two long (one-eighth inch), filiform, many-branched protuberances, each terminating in a minute pear-shaped knob from which project two short spines. When the larva has just emerged from the egg, these protuberances are brown in the half next to the larva and red in the terminal half; but in a few hours the color changes so that the half next to the larva, the knob and the branches are dark brown, and the remaining portion is red brown. In the fourth to eleventh segments, inclusive, the dorsal line is marked by a fine black line, and the sub-dorsal space is occupied by a colored band consisting of five delicate lines; first a white line just below the sub-dorsal line, next a black line, then a gray line, then a white line and then a black line. The eleventh segment is quite prominent, bearing upon the dorsal line a large, many-branched, dark red-brown protuberance. The twelfth segment has two dorsal and six lateral green tubercles, each giving rise to a short black hair. Legs green, tipped with brown; prolegs green.

Larvæ passed their first moult June 4, devouring their cast-off skins; one-quarter inch long, bright green. Head sub-quadrate, bilobed, brown with a narrow green line on each side, running from the dorsal line to outer margin of mandibles. Each segment, from first to eleventh, inclusive, has two rows of six tubercles [three on each side of dorsal line, situated as before first moult]. The anterior row of each segment consists of conical yellow tubercles, each emitting a short black hair, while the tubercles of the posterior row are smaller, rounded and white. The protuberances on the second, third and eleventh segments are entirely brown in color, and those on the second and third segments are three-sixteenths inch in length, but otherwise unchanged. The twelfth segment is now much flattened above, triangular in shape and studded with small white tubercles. The stigmatal line, from the fourth segment to anus, is occupied by a delicate black line bordered above by a narrow, and below by a broad white line. Legs and prolegs green, tipped with brown.

Larvæ moulted the second time on June 8; one-half to five-eighths inch long, nearly cylindrical, bright green. Head as large as any other segment, green, sub-quadrate, bilobed, with a white line running from the top of the sulcus between the lobes to the outer margin of the brown mandibles, giving the casual observer the impression that the head is small and triangular, with the mandibles for the base of the triangle. Head covered with minute hairs. First segment as before moulting. The protuberances on second and third segments are one-quarter inch long, of a pink color, with the branches tipped with black, and terminal knob carmine-red. The tubercles on the second to eleventh segments, inclusive, are exactly as in first moult, except that the tubercles of the anterior row of each segment, situated on and just below the sub-dorsal line, are now ivory-white and, on the fifth, seventh, ninth and tenth segments are prolonged and horn-shaped. The protuberance on the eleventh segment is now pink, with white spines tipped with black. The twelfth segment is flattened above, triangular in shape, with the anal extremity slightly bifid, and the sides make an acute angle with the venter, the sub-stigmatal row of tubercles projecting so that the anal prolegs are entirely concealed from above. The whole flattened surface is studded with small green tubercles. The stigmatal line is marked by a band of colors, composed of a fine red line, bordered above by a narrow bluish line, and below by a white line, below which is a bright yellow line. Legs and prolegs green, tipped with brown.

Larvæ passed their third moult June 13th, three-quarters to seven-eighths of an inch long, nearly cylindrical, green. Head green, bilobed, minutely pubescent. Mandibles, brown, covered with minute hairs. First segment at first as in last moult, but towards the end of this moult it becomes very prominent and sub-triangular in shape, with a yellowish-white line on each side of anterior border, running from near the dorsal to the stigmatal line. The protuberances on the second and third segments have now lost the knobs at their extremities and are brown in some larvæ and green in others. The only other changes are that the horn-shaped tubercles on the fifth to tenth segments are now larger and more prolonged, and are pink on the inside and have the appearance of burnished silver externally, and the stigmatal line is occupied by a marked band of color, consisting of a dark carmine line (passing through the inconspicuous green stigmata) bordered above by a narrow pale blue, and below by a white line. The legs of some larvæ are green and of others brown. Prolegs of some, green, and in others green tipped with brown. In some larvæ the stigmatal space has numerous small black tubercles on each segment; in others there are no black tubercles.

Larvæ passed their fourth moult on June 17th. Length, 1¼ to 1½ inch. Nearly cylindrical, green. Head green, subquadrate, bilobed, covered with minute green granulations, as is also the whole of the body. The dorsum, subdorsal and stigmatal spaces of all the segments are thickly sprinkled with minute white tubercles, while in the stigmatal space there are many minute black tubercles scattered among the white ones. The protuberance on the second and third segments are now one-eighth to three-sixteenths of an inch long, slightly conical, pink, with a number of white tubercles scattered along them, marking the places of the former branches. The "silver horns" on the fifth to the tenth segments are now one-sixteenth to one-eighth of an inch long, bright pink inside and burnished silver externally. The number of these "silver horns" varies in different larvæ, some having them only on the seventh and ninth segments; others have them on the fifth, seventh and ninth segments; still others have them on the fifth, seventh, ninth and tenth segments. I have never found these silver horns on any other segments than those mentioned above, nor have I ever found a larva in which they were wanting, or in which they were present, on only *one* segment.* The stigmatal line is marked by a dark carmine-red line bordered below by a white band. Just below the stigmatal band of colors is a row of prominent black conical tubercles, one to each segment. The protuberance on the eleventh segment is pink with round white tubercles marking the places where the branches were. Legs and pro-legs green.

The larvæ change only in size during the last moult, and are from two to two and one-half inches long when full grown. They began to quit feeding on the 20th of June, entering the ground within a few hours after ceasing to eat. There they pupated within an oval cell lined with a thin cocoon of silk, the first casting its skin on the 24th. The pupa is at first bright green, but changes to jet black in a few hours. Pupa is nearly cylindrical,

---

* A larva found by a friend (by bushbeating) in company with *Bicolor* larvæ, having no silver horns, but only the rudiments on *one* segment, but otherwise resembling *Bicolor* larva so closely that he supposed it to be only larval variation, disclosed a ♂ *Anisota bisecta*, Lint.

the anterior extremity being nearly hemispherical and the posterior extremity tapering rapidly in the last two segments to a blunt point which is extended into a bipronged spine three-sixteenths of an inch long. The surface of the hemispherical portion is studded with minute sharp triangular points. Wing cases small, covering only the sides and under surface of the anterior one-third of the pupa. Four of the abdominal segments are separated by a broad, deep sulcus; the anterior and posterior margins of these segments are armed with a row of minute sharp spines.

Imagines began to appear on July 3d, and had nearly all emerged by July 10th.

The insect is three-brooded here, hibernating in pupa. Although the large majority of each brood follows the cycle of development as described, yet a few of each brood are much slower in making their changes. Thus a few of the brood did not complete their growth till the end of July, and three pupæ formed June 26 are still alive (Feb. 28th), having hibernated. Other pupæ of the same brood disclosed their imagines at various periods during July and August. This accounts for the fact that larvæ in all stages of development may be found at any time throughout the summer till frost kills their food plants, which are *Gleditschia triacanthos*, *L.* (Honey Locust or Three-horned Acacia) and *Gymnocladus Canadensis*, *Lam.* (Kentucky coffee-tree.)

Up to the third month the larvæ, when alarmed, move the protuberances on the second and third segments as if to frighten away the intruder. The larvæ pupate readily on the bottom of the breeding cage if ground is not furnished them. In this case they build no cocoon.

THE NOCTUIDÆ IN THE MISSOURI ENTOMOLOGICAL REPORTS.

BY C. V. RILEY, M. A. PH. D.

To the Editor of "PAPILIO:"

There are two articles in "PAPILIO," (Vol. I, No. 8), by Mr. A. R. Grote, to which I beg leave to reply, in the belief that in so doing I may contribute something to Lepidopterology, and charitably overlook reflections unjust and irritating.

In the "Note on *Agrotis repentis*," (p. 126) Mr. Grote again changes his mind as to the synonymy of this species, weakening his previous argument to the effect that it is identical with *A. messoria*, Harris. On p. 77, of Bulletin No. 6, U. S. E. C.,* after repeating the original description of *A. cochranii*, Riley, I remark, "There is little question but that this is the moth briefly characterized by Harris (Ins. Inj. to Veg., p. 444) as *Agrotis messoria*, an examination of the type confirming this view. *A. repentis*, G.

---

* General Index and Supplement to the nine Reports of the Insects of Missouri, Washington, March 24, 1881.

and R., and *A. lycarum* are also conceded by Grote to be synonyms."

I have on two occasions, by an examination of the types in Harris's collection, satisfied myself that *messoria* and *cochranii* are really identical, and notwithstanding Mr. Grote states that he was unable to find the species in Harris's collection, it must be there, unless destroyed or taken away since 1876. Mr. H. K. Morrison also informs me that it was there in 1874, when he carefully studied and compared it with specimens of *cochranii*. Whether *repentis* is or is not the same, this deponent sayeth not, further than that the figure and description of this last confirms the conclusion that it is.

The readers of "PAPILIO" will doubtless wonder why a copy of Harris's original report should have caused Mr. Grote to change his mind, when the description of *Agrotis messoria* there given is repeated *verbatim* in all subsequent editions.

The little skirmish on the question of the identity of *messoria*, seems, however, but a feint to cover a general criticism of the descriptions of Noctuidæ in the Missouri reports, in which Mr. Grote finds "that most, if not all, of the Noctuidæ there described as new, *were in reality known to science*," and then specifies as follows:

> *Agrotis Cochranii*, Riley, is A. REPENTIS, G. and R.
> *Agrotis Scandens*, Riley, may be A. MESSORIA H.
> *Acronycta Populi*, Riley, is A. LEPUSCULINA G.
> *Prodenia Autumnalis*, Riley, is LAPHYGMA FRUGIPERDA A and S.
> *Xylina Cinerea*, Riley, is X. ANTENNATA, Walk.
> *Plusia Brassicæ*, may be P. NI. HUBN.
> The above are, I believe, all the new Noctuidæ in the Missouri Reports.
>
> Among the identifications of Noctuidæ in the same Reports, the following are erroneous: *Prodenia Commelinæ*, Riley, is not Abbot and Smith's species, but *Lineatella* of Harvey. (It is possible that *Flavimedia* and *Lineatella* are sexes of one species). Again, the *Agrotis Jaculifera* of Prof. Riley includes *Agrotis Tricosa* of Prof. Lintner and, perhaps, *Agrotis Herilis*, Grote.

By way of comment on the above permit me to call attention to the following facts:

FIRST. That the synonymy there given in September was, so far as it is correct, published in The Bulletin above cited, copies of which were sent early in April to the New York Entomological Club, as well as to several of its members individually.

SECOND. That the species were, in most cases, published as new in the Missouri Reports, upon the determinations of Mr. Grote himself. To be more explicit:

1. Since it is admitted that *repentis* G. and R. is *cochranii*, Riley, and the latter, as I have proved by examination of the types, is *messoria*, Harr., it follows that this last cannot be *scandens*, Riley, which, in fact, bears no resemblance to it, and has always been pronounced a good species by Mr. Grote, both in his published papers and in his correspondence with me. It were

more appropriately compared with *murænula*, Grt. Assuming, however, for the sake of argument, that *messoria* is not *repentis*, then why is *cochranii* made a synonym of *repentis*, since the description of the former was published June 22, 1867, and that of the latter in January, 1868. Mr. Grote could at no time have claimed ignorance of the former description because he wrote me, by date of June 24, 1867, as follows: "I thank you for the *Prairie Farmer*, containing a detailed and interesting account of cut-worms, with your description of *A. Cochranii.* n. sp."

2. *Acronycta populi*. I have accepted Mr. Grote's decision that this is *lepusculina*, Guen., though, as I have pointed out, *populi* differs in several respects from the description of *lepusculina*. See Mo. Rep,, II, p. 121, and General Index, etc.: 6, p. 74.

3. *Prodenia autumnalis*. This was pronounced by Mr. Grote, by letter of August 25, 1869, as "Prodenia sp. new to me," and while I have long since accepted *Laphygma frugiperda*, S. and Abb., as a synonym of one of its varieties, the other varieties would, without the proof to the contrary, which I gave, have undoubtedly been described as distinct.

4. *Xylina cinerea*. This was pronounced different from anything known to Zeller, at the time of the description, and was then, and for several years thereafter, pronounced a good species by Mr. Grote. I discussed its affinities at the time of the description, and the authors of the recent "Check List of Macro-lepidoptera," published by the Brooklyn Entomological Society, express their doubt as to the identity of *cinerea* and *antennata* by retaining the former without number. I have since read Walker's description, and no one could say positively what is meant without seeing the type.

5. *Plusia brassicæ*. This was described as new on the authority of Zeller, as stated at the time. Speyer, as I have shown (General Index, etc., p. 78), proves it to be really distinct, and his careful comparisons will doubtless convince most Lepidopterists.

6. *Prodenia commelinæ*. This was so pronounced by Mr. Grote, from a specimen sent him August 8th, 1867. *Flavimedia* and *lineatella* were characterized by Mr. Harvey, some years later, as I have stated in the "General Index," p. 56. Here again, however, as in the case of *A. subgothica* and its forms we have, I am satisfied, a question of varieties rather than species. With the well known varieties of *Laphygma frugiperda* in mind, I have been particularly interested, for a good many years, in breeding this Prodenia, and I record here my belief, which will be the accepted belief in the future, that *flavimedea* and *lineatella* are one species not distinct from *ornithogalli*, Guen. The larvæ, so far as I have bred material, are extremely variable and not separable, and the same may be said of the mature insects. They are more readily separable from the typical *Commelinæ*, though doubts, even as to their specific distinctness from it are justifiable.

7. *Agrotis jaculifera.* This (Mo. Rep. I, p. 82) neither includes *tricosa* Lintner, nor *herilis* Gr., but, as stated in the "General Index," (p. 56), the true *subgothica,* Haw. Mr. Grote was formerly of this belief, too,* and, it may be of interest to state, in this connection, that upon sending plate I, of my first Mo. Rep. for his opinion of the various species figured thereon, prior to publication, he replied from Danopolis, Ala., by date of March 17, 1869: "No. 11 is *A. subgothica* of which *A. jaculifera* is a synonym." In the "General Index" I have simply stated the fact, without further comment, that, subsequent to the publication of the first Missouri Report, fig 59*a*, had been described as *herilis* by Mr. Grote, and 59*b*, as *tricosa* by Mr. Lintner. It may be as well for me here to record my firm belief that we have to do in this instance with mere variations of one species, and that Guenée and the older authors were wiser in so considering them than the later authors in separating them as distinct species. I fully appreciate the care with which Mr. Lintner has separated the three well marked forms, but with every year that I have been able to get additional material for comparison, I have been more and more convinced of the correctness of the view here expressed, and that between the typical *subgothica* on the one hand, and *herilis* on the other, there is a perfect series, so that it is impossible, in some instances, to refer specimens to any one form more than another.

To sum up, I maintain that Mr. Grote, where he is not actually wrong in his conclusions, or opposed to men whom he himself acknowledges as authorities, simply repeats what I had six months previously published; further, that the present synonym of the species described in the Mo. Reports was *not* known at the time of the descriptions, and that if, as he avers, the species were "known to science," the blame for the synonym falls partly on him who, claiming special knowledge in the family, was not aware of the fact when the moths were referred to him.

Opinions as to the relations of such forms as *Agrotis herilis*, and *A. tricosa*, *Prodenia lineatella* and *P. flavimedia* will differ according to the conception of what constitutes a species, and there is all the less reason for dogmatism. However I may differ from the describers of those forms as species, I recognize the value of their work in separating the forms and the convenience of designating them by names. "In the field of [science no less than of] thought and literature it is no less our duty to speak and write in such a way that comprehension and knowledge may be increased by our labors without offense being given,"† and, I would add, in such way that practice comport with preaching.

I reserve remarks on Dakruma for another occasion.

---

* **Bull. Buff. Soc. Nat. S. I., p. 100.**

† **"The New Infidelity," by A. R. Grote, p. 91.**

DESCRIPTION OF NEW SPECIES OF BUTTERFLIES FOUND IN THE UNITED STATES.

By W. H. Edwards.

1. Anthocharis Rosa.
2. Limenitis Hulstii.
3. " Arthemis. aberr. C.
4. Lemonias Duryi.
5. Lycæna Annetta

Anthocharis Rosa.

Male.—Expands 1.2 inch.

Upper side pure white, gray at bases of wings; primaries have a short, straight, black bar on costal margin near apex, turned back obliquely. which, extended, would strike middle of inner margin; another bar on hind margin on upper branch of median; the apical area between these almost immaculate, a few scattered black scales only lying near costa; on arc of cell, a narrow black bar, bent or a little sinuous; costal edge sometimes pure white, immaculate; sometimes with a few black scales and points. Secondaries are of thinner texture, discovering the markings of under side; at outer angle a slight edging of black at the upper branch of sub-costal, and the fringe against this is black; also, there is black fringe at end of the lower branch of same nervure; otherwise all fringes are white.

Under side white, with a pink tint over costa of primaries and all of secondaries above sub-costal nervure, deepest next base; costal edge either immaculate, or with five or six separate black points; the discal and costal bars repeated, reduced, the latter densely covered with yellow scales; the bar on hind margin suppressed, but represented by yellow: the nervules about apex yellow, and on costal edge a black streak at end of each nervule.

Secondaries have three cross bands of black, sprinkled thickly with yellow scales, with some open spaces or spots, discovering a yellow ground; the anterior band narrow, making a circle about base; the second, discal, sends a short, stout branch along median nervure to third, then narrows and is attenuated to a point at inner margin; the third, starting on inner margin, is broad, and after the junction with second, narrows greatly, then widens and strikes hind margin in a triple fork; at outer angle a short, narrow bar similar to the bands; the nervures and branches on middle of the wing yellow.

Body black; the thorax covered with long gray hairs; beneath, thorax yellow, abdomen white along venter; legs pinkish, the femora covered with long white hairs; palpi white with much gray; antennæ white above, yellowish below; club white above, yellow below and at tip.

Female.—Expands 1.4 inch.

Color of male, on both surfaces, similarly marked; a few black scales are scattered between the ends of the apical bars, suggesting a cross band.

From six examples, 3 ♂ 3 ♀, taken by the late Mr. J. Boll, in western Texas, March, 1878. Mr. Boll informed me, in answer to my inquiry, that he took many more, and all were of the type sent me. The species is nearest *Olympia*, Edw., and the banding of under side is of same character. It differs from that species by the immaculate apex, and by the presence of the straight, oblique costal bar, instead of an irregular patch.

LIMENITIS HULSTII.

Male.—Expands 2.75 inches.

Apical area of primaries and all secondaries one shade, pale red-fulvous, the remainder of primaries darker, and deepening gradually from inner margin to cell and costa, where the color is castaneous; costal edge of primaries brown, inner margin reddish-brown; hind margin broadly bordered with black, within the inner edge of which is a row of crescent white spots, or near costa rounded; beyond cell are four sub-triangular small white spots, one in the middle of each interspace, the two upper ones on narrow, dark fulvous ground, the others merely edged with this color; a white spot at origin of upper sub-costal interspace; in cell, next sub-costal, three-fourths the distance from base to arc, a white point surrounded by black scales. Secondaries have a broad black marginal border, through which runs a series of white points; across disk a macular black line, broken at the nervules, widening next costa, each spot edged on the inner side by white; the nervures and branches of both wings black, but not edged with black; fringes alternately black and white.

Under side of secondaries and of apex of primaries light orange-fulvous, clouded, whitish along the nervules; the remainder of primaries much as above; castaneous next base in cell; the black border crenated on inner side on both wings, the spots in same repeated, but now large crescents; between these and the margins another row of narrow whitish crescents; the spots on primaries repeated, enlarged, edged on outer side by deep brown, and a patch of same brown lies in lower median interspace, in line; a second spot in cell near base and next sub-costal; costa brown; on secondaries the black line is continuous, heavier, edged by white on inner side; the nervures of both wings black, without any edging of black scales.

Body above covered with fulvous hairs, below black on thorax with white spots on sides; abdomen with a buff lateral band and another on venter, between them a black stripe; legs black, the first pair white in front; palpi black, in front white, (antennæ in example under view wanting).

From a single male taken in Utah and sent me by Rev. Geo.

D. Hulst, of Brooklyn, N. Y., to whom I take pleasure in dedicating the species.

This species differs from *Disippus* in the pale color of upper surface (resembling Danais *Strigosa,* Bates), and in the contrast of color between the basal area of primaries, which is castaneous, and the apex, as also all of secondaries, which are pale colored of one shade; in the brown costal margin, and absence of the black patch and stripe beyond cell, which is a conspicuous feature of *Disippus*; in the presence of four white spots, triangular instead of rounded, of equal size instead of irregular; in the macular stripe on secondaries and its white edging, and in the absence of black scales to the nervures and branches. It is unlike anything I know. For two years I have kept this example without describing, hoping that others might come in, especially in Arizona collections.

LIMENITIS ARTHEMIS. aberr. C.

Upper side fulvous, obsured on primaries by much black, on secondaries but little; on the former, fulvous is most distinct in middle of cell, and below cell to inner margin; inside the marginal border a row of large dull fulvous spots, lying on the two discoidal and upper median interspaces; white spots beyond cell as in *Disippus*; a white dash on inner margin corresponding to what would be the white band in *Arthemis*; secondaries have a complete sub-marginal row of bright fulvous spots, and on the black area next over these, a narrow white band, of even width throughout, cut into spots by the black nervules.

On under side the fulvous is less obscured on primaries, and in cell next base is a large orange patch, and a broad bar across arc; the sub-marginal spots are continued to costa, and are mostly whitish on basal side. Secondaries have the fulvous spots and white band; the whole disk and area to base pale orange-fulvous with patches of orange disposed as in *Arthemis,* but of larger size.

This singular example seems to me to be a hybrid between *Disippus* and *Arthemis.* The color is of *Disippus,* so are the extra-discal white spots on primaries; but the sub-marginal spots of both wings are of *Arthemis*; the white band (*Arthemis*) is only found on secondaries and is very narrow, but there is a trace of the band of primaries on inner margin; the under side is of *Disippus,* but of primaries it is a mixture; the orange patches on both wings about bases are of *Arthemis,* but enlarged. This example was taken in Canada, and sent me for inspection by Mr. H. H. Lyman. I call this aberr. C., applying A and B. to the aberrations described (A. figured) on *Arthemis* plate, in Bt. N. A., Vol. 2., Plate 1, *Limenitis.*

LEMONIAS DURYI.

Male.—Expands .9 inch.

Whole upper surface orange-fulvous, except a narrow border of fuscous to hind margins; within this border a series of white dashes, one to each interspace, in the middle of each dash a black dot, and another at anterior end; across the disks a common row of black spots, small, mostly lunular; the row on primaries zigzag; on secondaries a double curve; on primaries several of these spots have white spots behind them, especially the three or four on costal margin, and the one in second median interspace; each wing has a white spot at end of cell, edged on either side by a black bar, and some black dots nearer base.

Under side of primaries light orange from base to margin, the border of hind margins ashy-brown; the dashes and spots repeated. Secondaries ashy-brown from base to margin; the marginal dashes and dots repeated, enlarged; across disk a row of fine white spots, the first and third from costa minute, the third small, the second large, oval, the fifth a patch on inner margin, all edged anteriorly by black; above these a row of three, the middle one of which corresponds to the cellular spots of upper side, and is edged on both sides by black; the other two on the anterior side only; three small white spots next base; fringes alternately white and pale fuscous.

Female.—Expands 1.1 inch.

Upper side colored as the male, being wholly orange-fulvous, except the borders. Under side as in male.

From 1 ♂ 1 ♀ taken by Mr. C. Dury in New Mexico, about five miles east of Mesilla, in some foot-hills of the Organ Mts., in 1881, about April 20. Size of *Mormo* and the general arrangement of the spots is as in that species, but the color is fulvous, whereas *Mormo* is fulvous on disk of primaries only, and not at all on secondaries. Mr. Dury writes that the species was rather abundant, and several examples were taken. It flew rapidly near the ground, alighting frequently.

LYCÆNA ANNETTA, *Mead.* Mss.

Male.—Expands 1.25 inch.

Upper side primaries blue; costal margin of primaries silvery next base; fringes white.

Under side white, with a faint blue tint; both wings have a marginal series of small fuscous spots, preceded by lunules, and behind the latter, on secondaries, yellow-fulvous; a little of this on primaries; on secondaries the three or four spots next inner angle are partly covered by pale blue metallic scales; on the arc of cell of each wing a fuscous bar.

Female.—Expands 1.05 inch.

Upper side pale or whitey brown, nearly white next the hind margins, with a blue shade over the posterior half of each wing and at base; primaries have a narrow fuscous border to this margin, and secondaries a black line; the cellular mark on primaries quite distinct, owing to the delicate texture of the wing; secondaries have a marginal series of round black spots, and the lunules of under side are repeated somewhat, together with the yellow patches.

Under side pale fawn-color over most of the surface, becoming white on the extra-discal areas; the markings as in the male, but more distinct, especially on primaries; in addition there is an extra-discal transverse row of fuscous dots on each wing.

From 1 ♂ 1 ♀ taken by Mr. T. L. Mead, near Salt Lake, Utah, in 1878. Several other examples were taken at same time. The species is close to *Anna*, Edw., but is of scarcely more than half the size (in superficial area). The male is color of *Anna*; the female quite different, *Anna* being dead-leaf brown, with a submarginal series of large fulvous crenations on each wing. In both sexes of *Anna* is a common transverse row of spots; elongated spots mostly on primaries; rounded on secondaries; in *Annetta* the series is wholly composed of mere dots, and is altogether wanting in the female under view.

NOTES ON LEPIDOPTERA.

Honey for Sugaring.—I want to suggest to the members of your Club to try extracted honey in sugaring for Lepidoptera. It must be pure and free from glucose, and can be obtained in solid candied form from L. C. Root, Mohawk, N. Y. I should not dilute it much (if any), but only liquify it. It will, I think, prove very attractive.—F. C. Bowditch, Boston.

Arctia Dione.—On July 8, 1881, I obtained a ♀, which gave 320 eggs. Half of these were lost or given to friends, but 63 went to chrysalis, and 28 hibernated as apparently full grown caterpillars. In due time 51 emerged as perfect moths, presenting very great variation in the markings. The eggs were placed close together in one patch, and in regular rows. Food plants, *Plantago* and *Polygonum*. Mr. R. Bunker, of this city, is rearing some Dione from eggs laid by my brood, and they hibernate as half grown caterpillars.—H. Roy Gilbert, Rochester, N. Y.

Synopsis of the Noctuidæ.—Mr. J. C. Smith is publishing in The Bulletin, Brooklyn Entm. Soc., a careful revision of this difficult group. It will, doubtless, be of great value to students.—Editor.

Rare Noctuids.—The following species were taken at Centre, N. Y., during the past year.

Leptina Doubledayi	Guen.	♀	August.
Hadena fractilinea	Grote.	♂ ♀	
Agrotis dilucida	Morr.	♂	September.
“ janualis	Grote.	2 ♀	
“ perpolita	Morr.	♀	
Scopelosoma tristisignata	Grote.	1 ♂ 2 ♀	October.
“ Morrisonii	Grote.	2 ♂ 1 ♀	
“ vinulenta	Grote.	4 ♂ 2 ♀	
Glaea viatica	Grote.	♀	
Xylina semiusta	Grote.	♂	
“ unimoda	Lintn.	♀	
“ lepida	Lintn.	2 ♂ 3 ♀	

The results of the past season have been, on the whole, remarkably poor. Where hundreds of examples came formerly to sugar, but few scattering ones were observed. W. H. Hill, Albany, N. Y.

Melittia cucurbitæ.—*Haw.* From numerous observations, I am assured that this insect hibernates in the caterpillar stage, and does not transform to the pupa state until the spring. The pupa cases are formed in the latter part of the summer, and, in every instance thus far, I have found the larvæ in the cases unchanged. The last examination was made only a day or two since. —N. Coleman, Berlin, Conn., February 24, 1882.

Bombycidæ of N. America.—The readers of "Papilio" will be glad to learn that Mr. R. H. Stretch is about to issue a volume, illustrating the whole of the known species of N. American Bombycidæ and Zygænidæ. It will contain about twenty plates, which will be lithographed in black and white only, from pen and ink drawings. The price will not exceed $2.50 for the whole work. We shall refer to the subject again, when the work is nearer completion.—Editor.

Parnassius Smintheus in California.—It has seemed somewhat strange that this species should have been so long unobserved in California, when its yellow spotted form (P. Behrii.) is comparatively common on the slopes of the Sierra Nevada. In June last, however, I observed the true Smintheus rather abundant in moist spots in the Shasta district, and later, that is in August, I saw considerable numbers in the wooded sides of the mountains near Castle Lake. I took one magnificent example, with very large red spots, at first sight looking like Par. Nomion. It was flying on the top of Mt. Bradley, about 7500 feet above the sea level, and seemed attracted to the flowers of a species of Sedum.—James Behrens, San Francisco.

PAPILIO.

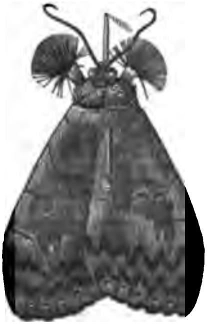
Organ of the New York Entomological Club.

Vol. 2.] April, 1882. [No. 4

FEMORAL TUFTS OR PENCILS OF HAIR IN CERTAIN CATOCALÆ.

By James S. Bailey, A. M., M. D.

The accompanying cut represents the fan-shaped brushes of hair found upon the *pedes medii* of certain *Catocalæ*. They are inserted in or near the trochanters, and lie concealed within the folds of and close to the spines of the femora, and reach nearly their entire length. The tufts are capable of being elevated at will, as seen in the engraving, and of being completely hidden when desired. When extended they open like a fan, and resemble an artist's fitch brush. The outer border has the appearance of having been evenly trimmed with scissors. During the season of 1881, at Center, N. Y., *Catocala concumbens* was quite numerous at sugar. In spreading, in some of the examples a single tuft was visible, but in no instance were both pencils seen at the same time in an individual without lifting one of them out with the point of an entomological pin. This was accomplished by passing the point through the scales, and very close to the trochanters, when the tufts were easily lifted from their resting places and exposed to view, which gave the



Catocala a novel appearance. One of them was allowed to remain unspread for illustration and cabinet use. Afterward, in examining other varieties of *Catocalæ*, similar phenomena were exhibited, but were only found in the male sex. Not being readily impressed with the importance of the discovery, I did not pursue my investigations through the different species captured during the season. Later I placed on damp sand for relaxation other *Catocalæ*, to see if they contained the same appendages, but I failed to detect them by the most careful manipulation. The result might have been different while the examples were fresh. Another year I propose to learn, if possible, if they are common in all species; if not, in which they are found.

Since the discovery I have been visited by a number of entomologists, who have examined the femoral tufts, but not one of them could explain the design and use of them, therefore the subject is brought to the notice of the readers of "PAPILIO" with the hope that some one can offer a satisfactory explanation.

To one having noticed the overtures of a male beetle in addressing his mate; having witnessed the gentle contact of his antennæ with hers, oft repeated, besides other demonstrations of an endearing nature, I think it may not be improbable to suppose that these tufts may be employed as an aphrodisiac. If for other purposes, I should be pleased to know them.

NOTES ON N. AMERICAN ÆGERIDÆ, WITH DESCRIPTIONS OF NEW FORMS.

BY HENRY EDWARDS.

BEMBECIA MARGINATA.

Trochilium Marginatum. Harris.

This appears to be one of the most common species of the whole group. It has been taken in abundance near Washington by Mr. H. Schonbörn, and again on Long Island by the Rev. G. D. Hulst, the latter gentleman having in print some most interesting observations upon its habits. It is undoubtedly referable to the genus *Bembecia*, and bears in many respects a striking resemblance to the European *Bembecia hylæiformis*. Our species has been re-described by Prof. Riley as *Troch. rubi*, and by Mr Hulst as *Sesia flavipes*. The synonomy should stand thus:

Bembecia (*Trochilium marginatum*) *Marginata*. *Harris*.
Trochilium Rubi. *Riley*.
Sesia Flavipes. *Hulst*. Bull. Brooklyn Ent. Soc.

TROCHILIUM CAUDATUM. *Harris*.

A ♂ in the collection of Prof. C. V. Riley has the transparent space of forewings exceedingly small, consisting only of two longitudinal streaks along the sides of the median nervule. The antennæ are bright orange. This singular species should form the type of a new genus, for which I propose the name of ALCATHOE. It may be readily separated by the caudal appendage of the ♂, which is as long as the abdomen, the forewings of this sex being partly transparent, while those of the ♀ are wholly opaque, resembling the genus *Sciapteron*. The hind tibiæ are furnished with a large bunch of hairs as in Melittia.

TROCHILIUM SYRINGÆ. *Harris*.

This species has been re-described by Herr Moschler in Stett. Entom. Zeitung, 1876, p. 311, as *Grotea longipes*. Herr Moschler writes me that it certainly forms the type of a distinct genus, and that he has elsewhere referred it to *Podosesia*.

TROCHILIUM TIBIALE. *Harris*.

♀. In this sex, which appears to have been unknown to Harris, the antennæ are without pectinations, and are much thickened towards their apical half. The bands of the abdomen are narrower, only covering half the segments in 3, 5, 6, 7. In all other respects it resembles the ♂. Montreal, Canada, Mr. G. J. Bowles.

Exp. wings, 35 mm. Length of body, 20 mm.

MELITTIA SNOWII. n. s.

Allied to *M. cucurbitæ*, Harris, but smaller, and singularly unlike in color. Head above, thorax, base of abdomen and upper side of forewings, pale fawn drab. Palpi, collar, pectus, fore coxæ and outer edge of tibiæ sordid white. Antennæ dull brown. Dorsal portion of abdomen dull brown, sides dirty orange, and lower portion sordid white. The hairs on the hind tibiæ are black inwardly, with a few bluish scales. Hind tarsi clear white. Abdominal margin of hind wings dull testaceous. Fringes of both, fawn drab. Beneath, the forewings are dull yellowish, darker at posterior margin. Hind wings with the abdominal margin of a brighter yellow shade than above.

Exp. wings, 22 mm. Length of body, 12 mm.

2 ♂, Kansas, Prof. Snow, to whom I regardfully dedicate this very interesting species.

MELITTIA AMŒNA. n. sp.

Head black in front, with a few bluish scales. Palpi above orange, beneath white, terminal joint black within. Eyes dull orange, with the orbits clear white. Antennæ bluish black. Thorax dull bronze black, with the collar pale dull greenish, and the long hairs on the sides sordid white, with dull greenish reflection. Abdomen black, with purplish reflection; posterior edges of the segments narrowly greenish white. Caudal tuft orange-brown, with black hairs. Bands on the lower side of abdomen a little wider than above. Fore coxæ black, with orange scales. Middle and hind coxæ black, edged with whitish. Fore and middle tibiæ rich orange exteriorly; black within. Bunch of hairs on hind tibiæ rich orange, with a few white scales intermixed; black within. All the tarsi are black. Fore wings purplish black, covered with bright metallic green scales, less visible below. Fringes of both wings, brownish-black.

Exp. wings, 27 mm. Length of body, 16 mm.

1 ♂, Douglas Co., Kansas, 900 feet, Prof. Snow.

SCIAPTERON ADMIRANDUS. n. sp.

Head with orange hairs between the eyes, the orbits of which are white. Palpi orange, antennæ chestnut-brown. Thorax dull brown, with narrow lemon-yellow streaks at base and on the sides, below the base of the wings. In front of the junction of the wings is a deep orange patch. Collar and a broad patch behind it lemon-yellow. Abdomen with two basal segments brownish-black; 3d, bright lemon-yellow; 4th, deep orange; 5th, lemon-yellow; 6th, 7th and 8th, deep orange, edged posteriorly with lemon-yellow. The posterior edges of 3d, 4th and 5th are purplish-black. The same colors extend beneath the abdomen. Caudal tuft, dull brown. Legs wholly deep orange. Forewings brown, with golden reflection; at their base a bright lemon-yellow spot. Hind wings with posterior margin of brown scales, which also extend along the median nervule to the posterior extremity of cell. Base and abdominal margin, rich deep orange. The vitreous disc is very opalescent. Fringes coppery brown. Beneath, the forewings have the base bright lemon-yellow, and the abdominal margins of the hind wings are bright orange.

Exp. wings, 32 mm. Length of body, 18 mm.

1 ♂, Texas (J. Boll). Kindly added to my collection by my friend, Mr. O. Meske, of Albany.

HARMONIA. n. genus.

Head free, as wide at base as at thorax. Palpi very long, sparsely clothed with hairs, terminal article twice the length of the rest. Antennæ slightly thickened towards the apex, with double row of very fine serrations. Thorax with long hairs at the sides. Abdomen long, narrow, the four posterior segments with lateral, broadly-spreading, fan-shaped scales. Caudal tuft unusually long and broad, divided in the centre and spreading. Fore tibiæ flattened, with the hairs very long beneath. Hind tibiæ also very long, reaching beyond the abdomen, and densely clothed with hairs. Forewings opaque. Hind wings vitreous, with large discal mark at the end of cell. In addition to the present species, this genus includes *Ægeria pini.* Kellicott.

HARMONIA MORRISONI. n. sp.

Head and thorax deep black, the latter with some pale yellow scales thinly scattered above and below. Palpi pale yellow at base, black towards terminal half. Antennæ bluish black at base and apical fourth; the middle straw color, wholly orange-brown beneath. Abdomen and caudal tuft wholly bluish-black above and below. Legs wholly bluish-black, except the tibiæ, which are pale straw color. Forewings golden-brown with purplish gloss, lightest toward posterior margin. Discal mark bright orange. Fringes of both wings bright golden-brown. Beneath the margins and base of forewings are straw color, discal mark as on upper side. The discal streak of hind wings is also edged with orange. 1 ♂, Montana Terr. Mr. H. K. Morrison, to whom I have much pleasure in dedicating the species.

Exp. wings 24 mm. Length of body, 18 mm.

Type. Coll. Hy. Edwards.

ALBUNA DENOTATA. n. sp.

♂. Head black, with straw-colored line at base. Orbits of eyes, clear white. Antennæ brown above, bright orange beneath. Palpi black, straw color in front and at the tip. Thorax black, with double pale yellow spot at the sides. Abdomen black, with 3d, 5th, 7th and 8th segments rather broadly banded with straw yellow, the band continued beneath. Caudal tuft narrow and pointed (as in all the genus), black, with few yellow hairs. Thorax beneath with pale yellow spots at the base of the legs and of the wings. Coxæ and femora wholly black, with bluish reflection. Tibiæ and tarsi bright orange, with a few black hairs sprinkled over the latter. The forewings, with the exception of a vitreous streak above median nervule, are covered with golden-brown scales. Internal margin fiery red, with a bright pale yellow spot on the extreme base. Discal mark obscured. Hind wings vitreous, with discal mark bright coppery brown. Beneath both wings are golden-streaked; discal mark of superior pair distinct, bright orange.

Exp. wings, 26 mm.

♀. Same as ♂, with the antennæ simple, and the vitreous streak of forewings less apparent.

1 ♂ 2 ♀. Montana Terr. H. K. Morrison.

Types. Coll. Hy. Edwards.

ÆGERIA EXITIOSA. n. var. FITCHII.

I apply this name to the form of the ♀, in which the 4th segment of the abdomen only is deep orange, and in which "the space between the two inner veins of the hind wings is nearly, or quite, covered with blue-black scales, forming a stripe which divides the transparent disc into two parts." Fitch, Noxious Insects, Pt. 1, page 116.

In roots of wild cherry. Tallahassee, Florida. (A. Koebele.) W. Virginia. (T. L. Mead.)

ÆGERIA TECTA. n. sp.

Head jet black, with some white scales at the base of the eyes and between the antennæ. Palpi very pale yellow, with the last article black. Antennæ blue black above, castaneous beneath. Thorax with narrow buff lines on sides and at base. Abdomen with narrow buff band on basal segment, a wider on the 2d, none on the 3d or 5th, a very wide one on 4th, and narrow on 6th and 7th. These bands are repeated on the under side. Caudal tuft, bluish-black above, with some pale buff hairs beneath. Forewings with costal and posterior margins, bronze black, internal margin very pale yellow for its basal two-thirds. The discal mark is bronze brown, with the posterior edge orange. The transparent space between the cell is very large, much larger than in *Æg. tipuliformis*, and allied species, thus leaving the posterior margin very narrow. The margins of secondaries are also very narrow, that of the costa being very pale yellow. On the under side of forewings is a bright purplish reflection, not visible above, the margins and nervures being all pale yellow, except on posterior margins, where they are bronze black. Hind wings as on upper side. The legs are blue black, banded with very pale yellow. 2 ♂. Prescott, Arizona. J. Doll.

Exp. wings 16 mm.

Types, Coll. B. Neumoegen.

ÆGERIA HENSHAWII. n. sp.

Closely allied to *Æg. fulvipes*, Harris, of which it may be an extreme variety. It differs, however, from that species, in the following particulars: The abdomen is wholly black; the base of the fore wings has a fiery red spot, the discal mark is edged posteriorly with fiery red, and beneath, the costal margin for its apical half, and the margins of the discal mark are of the same color. In other respects it is the same as *Æg. fulvipes.*

Exp. wings, 22 mm.

1 ♀. Mingan Island, Labrador, Mr. S. H. Henshaw, who has kindly aided my labors in this difficult group, and to whom I dedicate this pretty species.

ÆGERIA ASILIFORMIS. Rott.

Specimens of this species, exactly agreeing with European examples, have been taken at Walpole, Mass., by Miss C. Guild; at Winchester, Mass., by Mr. R. Thaxter, and at Cambridge, Mass., by Mr. P. R. Uhler. These are preserved in the collection of the Boston Soc. Nat. History (Nos. 1341, 1342).

ÆGERIA TIPULIFORMIS. L.

In some specimens from Ohio, the vitreous spaces are somewhat larger than in the European form, the color is more intense black, the caudal tuft beneath has a larger proportion of yellow, and the insect has generally a more delicate appearance. These may prove to belong to a distinct species.

ÆGERIA QUINQUECAUDATA. Ridings.

♀. The type of this species was a ♂. I think the present is the first descriptive notice of the other sex. The forewings are greenish black, with metallic reflection, purplish at the posterior margin. Hind wings dull black, opaque, except at the base, which is more or less transparent. Fringes of both wings brown black. Under side of wings wholly purplish black, nervules with a greenish shade. Antennæ and head dull black. Thorax greenish black, with the tegulæ deep orange in front. Abdomen steel black, with the 4th segment wholly deep orange. The "tails," so characteristic of the ♂, are are wanting in this sex. The palpi are deep orange below, bluish above. Legs and under side wholly greenish black.

Exp. wings 26 mm.

2 ♀. Georgia. H. K. Morrison.

Types. Coll. E. L. Graef. F. Tepper.

This singular form is certainly not congeneric with *Ægeria acerni*, *Æ. pyri*, etc., the abdominal appendages of the ♂, and the opacity of the forewings serving to distinguish it. I propose for it the generic name of SOSPITA.

THE LIFE-HISTORY OF EUSTROTIA CARNEOLA, GUENEE.

By D. W. Coquillett.

EGG.—Button-shaped, grooved vertically, pale yellowish white; in the centre of the upper side is a reddish dot, and a short distance outside of this is a reddish circle; transverse diameter about ⅓ mm.

LARVA.—*First stage.*—Body green, marked with a subdorsal white line and a stigmatal white stripe; piliferous spots obsolete; head and venter green, unmarked; sixteen legs;* length 10 mm.

Second stage.—Same as in the first, except that there is a white dorsal line and the piliferous spots are white; length 13 mm.

Third and last stage.—Body green, sometimes tinged with pink; sutures of the segments sometimes yellow or brown; a white dorsal line usually edged with black; a white subdorsal line and a white stigmatal stripe; subdorsal surface sometimes tinged with black or purple; spiracles white, ringed with brown or black; head and venter green, unmarked; length 19 mm.

---

*Dr. Packard, in his "Guide to the Study of Insects" (p. 316), erroneously says that the larvæ of *Erastria* (*Eustrotia*) have only three pairs of abdominal legs.

CHRYSALIS.—Of the usual shape, polished yellowish brown; posterior end quite robust, terminates in two short hooks; length 9 mm.

The lighter colored larvæ closely resemble those of *Telesilla cinereola*, Guenee, which I have bred from ragweed (*Ambrosia artemisiæfolia*), and from burdock (*Lappa officinalis*). The last named larvæ never have the body tinged with black or purple, and the dorsal space is tinged more or less with white. But the greatest difference between these two larvæ is in the markings on the head; for while in *carneola* the head is unmarked, in *cinereola* it is marked with an inverted v-shaped white mark on the face, and a white dash on each side. The larva of *Hypena scabra*, Fabricius, which feeds upon clover, closely resembles that of *carneola*, but is readily distinguished from it by having only three pairs of abdominal legs, *carneola* having four pairs.

The food plants of this species are yellow dock (*Rumex*), smartweed (*Polygonum pensylvanicum*), and probably golden-rod (*Solidago*). I have bred the moths from larvæ found feeding upon the two first mentioned plants, and have found upon a golden-rod a larva not differing very much from the above.

The eggs are deposited either singly or in clusters of from two to four, and in midsummer hatch out in about four days. When jarred from their perch the young larvæ hang suspended by a silken thread. When fully grown, they enter the earth and each one forms an oval cavity, in which it spins a thin cocoon. The length of time which they spend in their different stages varies, but is about as follows: First stage, 10 days; second stage, 2 days; third stage, to entering the earth, 4 days; entering the earth to imago, 12 to 16 days—completing the cycle from egg to imago in about five weeks.

Two broods are produced in one season, the imagos of the first brood appearing during the month of July and early in August, those of the second brood passing the winter in the chrysalis state and issuing throughout the month of May of the following year.

FOOD PLANTS OF TELEA POLYPHEMUS IN THE COUNTY OF YORK, ONTARIO.

[From a paper read before the Natural History Society of Toronto, by W. BRODIE.]

Riley, in his Missouri report for 1871, gives a list of 19 food plants; 10 of these, although found here, are not on my list. These 10, with my list, give a total of 49 species.

ORDER, TILIACEÆ.

Tilia Americana	Linn.
Tilia Europæa	Linn.

ORDER, ROSACEÆ.

Crataegus coccinea	Linn.
" *tomentosa*	Linn.
" *crux-galli*	Linn.
Amelanchier Canadensis	Torr & Gray.

ORDER, GROSSULACEÆ.

Ribes cynobati	Linn.

ORDER, HAMAMELIDACEÆ.

Hamamelis Virginica	Linn

ORDER, CUPULIFERÆ.

Quercus alba	Linn.
" macrocarpa	Michx.
" rubra	Linn.
Corylus Americana	Walt.
Corylus rostrata	Ait.
Fagus ferruginea	Ait.
Carpinus Americana	Michx.
Ostrya Virginica	Willd.

ORDER, JUGLANDACEÆ.

Carya tomentosa	Nutt.
" amara	Nutt.
" alba	Nutt.

ORDER, BETULACEÆ.

Betula lenta	Linn.
" excelsa	Linn.
" alba	Spach.
" papyracea	Ait.
Alnus incana	Willd.
" serrulata	Ait.

ORDER, SALICACEÆ.

Salix alba	Linn.
" humilis	Marshal.
Populus grandidentata	Michx.
" tremuloides	Michx.

Cocoons constructed on thorn trees usually hang during the winter; the petioles being short, several strands of silk are firmly attached to the twigs. In a few cases I have noticed the twig and petioles coated with silk approaching the habit of *C. promethea.*

Cocoons spun by larvæ, fed on basswood, oak or birch, are usually large and the silk of superior quality.

In long and warm seasons about 50 per cent. are double-brooded, but this is against the increase of the species, as cold weather usually sets in before the larvæ are fully matured.

DESCRIPTION OF A NEW HYPERCHIRIA FROM ARIZONA.

By B. Neumoegen.

Hyperchiria Pamina. n. sp.

♂. Antennæ dark luteous. Head and thorax light olive color. Patagiæ with light yellow tuft at the end. Primaries falcate, light olive, somewhat darker at base, but lighter along exterior margin. An irregular, transverse yellowish line, with anterior brownish border from very near apex to the centre of interior margin. An irregular square discal blotch of olive color, with dark dots at the intersection of nerves. A white testaceous lateral line at thorax, between the base of costa and base of interior margin.

Secondaries very light olive color. The ocellus blackish blue with white centre, sprinkled with bluish dust. An irregular semi-circular black line, from costa to and partly along abdominal margin, enclosing the ocellus. The field enclosed by this line, of bright, light yellow color, somewhat fading towards base. In the space between this line and exterior margin, and running parallel to both, a purplish, rose-colored, irregular band terminating very near anal curve. A conspicuous, bright rose-colored tuft from base, along abdominal margin, fading toward the centre and anal curve. Abdomen fawn drab, with bright rose-colored segmentary bands.

Beneath, primaries and secondaries fawn drab. The transverse line of primaries of purplish rose tint, the interspace between this line and base being likewise of a lighter purplish rose, fading towards costa. Discal spot conspicuous, black with white central dot. A white discal spot on secondaries and indications in purplish rose-color on the same, of the semi-circular line and its parallel band.

♀. Of a lighter olive tinge. The ocellus and its white centre on secondaries more pronounced than in ♂.

Beneath, on secondaries a purplish line, not exactly following the course of the semi-circular line on upper surface, but curving into an undulated line below discal spot, and terminating in the centre of abdominal margin, thus assuming somewhat the shape of an interrogation sign. In other respects agreeing with ♂.

Some of the examples vary from drab fawn to true olive color.

VAR. AUROSEA.

This is a splendid variation of the above described insect, the head, thorax and primaries being of a golden yellow color, with sprinkling of light rose-colored dust; the tuft, along abdominal margin of secondaries, of bright rose-color, and the parallel band between the black semi-circular line and exterior margin of bright purplish red.

Expanse of ♂, 2¾–3 inches; ♀, 3–3⅝ inches.

Length of body of ♂, ¾–⅞ inches; ♀, 1–1⅛ inches.

Habitat, Prescott, Arizona.

Caught and raised by Mr. J. Doll. A description of the larva and it moults will be given in one the ensuing numbers.

This wonderful insect can proudly rank, in regard to beauty, with any of its relations of tropical America.

As Felder, Walker, Westwood and others have described various species of Hyperchiria from Mexico and adjacent countries, I hesitated with the description of H. Pamina, for fear of creating a synonym. I finally applied to the kindness of Mr. H. Strecker, who has extensive working material on hand, and he returned H. Pamina to me as "new."

ON THE EARLY STAGES OF TWO PLUME-MOTHS.

BY D. W. COQUILLETT.

ŒDEMATOPHORUS INQUINATUS, Zeller.—*Larva.*—Body green, sparsely covered with raised white dots; warts concolorous, each bearing from two to six stiff, curved, diverging white bristles of different lengths; spiracles raised, whitish; head partially retractile into segment one, green, tinged with brown and marked on each side with a black spot above the jaws; venter green, unmarked; length 12 mm. Two specimens. Lives on *Ambrosia artemisiæfolia.* One pupated July 27, producing the imago August 3; the other pupated July 30 and the imago emerged August 6.

Chrysalis.—Of the usual shape, pale ash color, marked with a large pink spot near the middle of the upper side; on this spot is large brownish-black spot; length 7 mm. The chrysalis is fastened by its posterior end to the upper side of some object, from which it stands in a oblique direction, the abdomen being slightly curved.

LIOPTILUS HOMODACTYLUS, Walker.—*Larva.*—Body green; a dorsal white line, and a short distance each side of this is a faint whitish stripe; a broken subdorsal whitish line, and sometimes a similar stigmatal one; warts concolorous, and from each issues a spreading cluster of six or more whitish hairs; segment one projects slightly over the head; head and venter green; length 14 mm. Feeds on *Solidago Missouriensis.* Three specimens; very sluggish. One pupated June 15, producing imago June 28.

Chrysalis.—Of the usual shape, white, tinged in places with green, quite thickly covered with white piliferous spots, each bearing one or two white bristles; length 10 mm. The chrysalis is fastened ventrally to one side of some vertical object.

For the determination of the above species I am indebted to Mr. Chas. Fish.

NOVA SPECIES GENERIS CERATOCAMPA.

By D. H. WEYENBERG, Cordova, Buenos Ayres.

C. VOGLERI. n. sp.

Alae anteriores subfuscæ-subolivaceæ maculis albis ellipticis, in margine externo triangularibus alae posteriores flavæ, speculo centrali sanguineo, fascia nigra ad marginem externum emanans. Collo axillisque sanguineis.

Thorax lineis duabus parallelibus albis ornatis nec non pleuræ linea curva alba; abdomen subfuscum articulationibus sanguineis et linea laterali alba; pedibus subfuscis.

Alarum expansio 9 centim. Corporis longit. 4, 5 centim.—Habitat, Cordova.

CORDOVA, Argent., 1881.

NOTES ON LEPIDOPTERA.

COTTON-WORM MOTH.—The Moth of the Southern "Cotton Worm" (*Aletia argillacea*) has occurred in this county in immense numbers during the past fall. I first met with it September 12 on the shore of Lake Ontario, a few miles west of Charlotte. The bodies of the dead and dying insects formed quite a perceptible ridge along the water line, while among the *débris*, just out of reach of the waves, thousands had crawled and were drying their wings on the sticks and stones; a great many other insects of all orders were also present (apparently overtaken and drowned by a violent storm that occurred the night before), but *Argillacea* outnumbered the whole by more than a hundred to one.

A few days later *Argillacea* appeared in profusion in the orchards and gardens in the district. The insect is said to be injurious to peaches in the South; it is interesting to know that here in the North it still retains its liking for that fruit. I captured thirty-two individuals one evening on four bruised peaches, and I also found it in abundance sucking the juices from ripe pears; hundreds could be shaken from grape vines during the day time; the proprietor of a vineyard in the neighborhood assured me that they severely injured his grape crop by sucking the ripe fruit. I met with it every mild evening until December. Even at this late date their fondness for fruit was indicated, as I found them on rotten apples.—DAVID BRUCE, Brockport, N. Y.

EARLY BUTTERFLIES IN CALIFORNIA.—In a letter recently received from Mr. M. G. WRIGHT, of San Bernardino, California. He says: "The season opened here very finely. On February 5th I took twenty-seven examples of *Lepidoptera;* February 12th, three examples; February 20th, thirty-two examples; March 1st, eighty-three examples; March 5th, fifty-six examples; March 10th, seventeen examples. Since this date the weather has been very cold and wet, so that I have taken very little."

XYLINA CINEREA.

If Professor Riley will refer to Bulletin U. S. Geolog. and Geogr. Survey of the Territories, vol. v., p. 201, he will find why Professor Grote regards X. *Cinerea* as=X. *Antennata*, Wlk. This paper was possibly overlooked by the authors of the Brooklyn Check List. I will add that the Noctuids which I took with me to Europe for comparison were sent to me for that purpose by Prof. Lintner. I have long been familiar with X. *Cinerea*, and the specimen sent to me by Prof. Lintner was in good condition, as was also the type of X. *Antennata*. I compared them carefully, and there is no doubt of their identity.—C. H. FERNALD, Orono, Me.

ILLUSTRATIONS OF NOCTUIDÆ.

(Plate I., Vol. 2).

By A. R. GROTE.

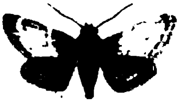
On the accompanying Plate I. figures 1 and 2 represent *Rhododipsa Miniana*, which was discovered by Prof. Snow in Northern New Mexico, and described by myself in "PAPILIO" for October of last year. This species is one of a number of pretty Heliothid forms in which our Western Noctuid fauna is so rich. Figures 3 and 3*a* represent *Gortyna Rigida*,* Grote, an Eastern species collected by Mr. Thaxter in Massachusetts, who kindly sent me the male here represented. I have restored to this genus the term *Gortyna*, not using this name in the restricted sense in which Lederer employs it, viz., for the European *Flavago*, which has the clypeus mucronate, and should be referred to *Ochria*. A synonymical note upon the use of *Gortyna* will by found on page 37 of my "Check List." Figure 3 represents the side view of *Gortyna Rigida*, showing the thoracic tuftings, which are important in classifying the *Noctuidæ*. Figure 4 represents *Schinea buxea*, described by myself in the "Canadian Entomologist," and received from Texas by Mr. B. Neumoegen.

---

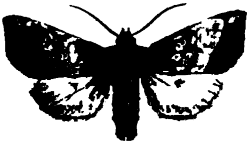
*Erroneously printed "Rifida" in the plate.

ERRATA IN PROF. RILEY'S COMMUNICATION IN THE MARCH NUMBER.—Page 44, line 4, omit the third comma; same page, line 7, for "Danopolis" read "Demopolis;" same page, lines 29 and 31, for "Synonym" read "Synonymy."

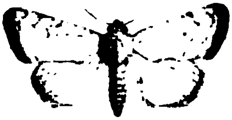
1



3



4



3ª

2

Clement pinxit Millot sculp

1 2 Miniana _ 3 3ª Rifida _ 4 Buxea

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] May, 1882. [No. 5

LIST OF LEPIDOPTERA TAKEN IN AND AROUND DAYTON, O.

By G. R. Pilate.

Species marked thus * have not been taken by myself; f. p.—food plant.

RHOPHALOCERA.

DIURNÆ.

1 Papilio Turnus, common. Food plant, Tulip tree.
2 " Turnus, ♀ var. Glaucus, not rare, f. p. Tulip tree.
3 " Ajax, common, f. p. Papaw.
4 " Ajax, var. Telamonides, common, Papaw.
5 " Ajax, var. Marcellus, common, f. p. Papaw.
6 " Asterias, common, f. p. Umbelliferæ.
7 " Troilus, common, f. p. Sassafras.
8 " Cresphontes, not rare, f. p. Prickly Ash.
9 " Philenor, common, f. p. Virginia Snakeroot.
10 Pieris Protodice, common.
11 " " var. Vernalis, common in spring.
12 " Rapæ, common, f. p. Cabbage, Nasturtium and Mignionette.
13 Colias Philodice, common, f. p. Red Clover.
14 " Philodice ♀ var. Alba, not rare.
15* " Eurytheme, one ♀
16 Terias Lisa, two or three every season.
17 Terias Nicippe, common, f. p. Cassia Marylandica. L.
18 Danais Archippus, common, f. p. different species of Asclepias.
19 Argynnis Cybele, common.
20 " Myrina, a few every season.
21 " Bellona, common.
22 Euptoieta Claudia, two or three every season.
23 Phyciodes Nycteis, common, f. p. Actinomeris Helianthoides.
24 " Tharos, common.
25 " " var. Marcia, common.
26 Grapta Interrogationis, common, f. p. Elm and Celtis.
27 " Interrogationis, var., Umbrosa, common, f. p. Elm and Celtis.
28 " Comma, not common, f. p. Nettles.
29 " Comma var. Dryas, not common, f. p. Nettles.
30 Vanessa Antiopa, common, f. p. Elm and Willow.
31* " Antiopa, Ab. Lintneri, only one, f. p. Willow.
32 Pyrameis Atalanta, common, f. p. Nettles.

33 “ Cardui, common, f. p. Thistles.
34 “ Huntera, not common, f. p. Echium Vulgare-L.
35 Junonia Coenia, common in 1880, rare before and after.
36 Limenitis Ursula, common, but hard to catch.
37 “ Disippus, common, f. p. Willow, Cotton-wood.
38 Apatura Celtis, common, f. p. Celtis.
39 “ Clyton, rare, f. p. Celtis.
40 Neonympha Eurytris, common.
41 “ Canthus, rare, only two taken.
42 Debis Portlandia, rare, only four taken.
43 Libythea Bachmanni, not common, f. p. Celtis.
44 Thecla M-Album, rare, one ♂ in 1880.
45 “ Humuli, rare, five taken in 1880.
46 “ Calanus, common, f. p. Oak.
47 Feniseca Tarquinius, rare, one ♀.
48 Chrysophanus Thoe, common, f. p. Rumex Britannica.
49 “ Americana, rare, six specimens taken.
50 Lycaena Pseudargiolus, rare.
51 “ “ var. Neglecta, common.
51*Lycaena var. violacea, not rare in early spring.
52 Lycaena Comyntas, common.
53 Ancyloxypha Numitor, common.
54 Pamphila Hobomok, common.
55 “ Zabulon, common.
56 “ “ ♀ var. Pocahontas, not rare.
57 “ Campestris, common in 1880, rare before and after.
58 “ Huron, one ♀.
59 “ Phylaeus, rare, six ♂, one ♀.
60* “ Pontiac, rare, two specimens.
61 “ Egeremet, not very common.
62 “ Peckius, very common.
63 “ Cernes, very common.
64 “ Metacomet, rare.
65 “ Verna, rare.
66 Amblyscirtes Vialis, rare.
67 Thanaos Brizo, common in one locality.
68* “ Juvenalis, rare.
69 Pholisora Catullus, common.
70 Eudamus Pylades, common.
71 “ Lycidas, rare, never taken till last season.
72 “ Tityrus, common, f. p. Locust.

HETEROCERA.

SPHINGIDÆ.

73 Smerinthus Modestus, rare, ♂ and ♀.
74 “ Juglandis, rare, ♂ and ♀.
75 “ Geminatus, common f p. Willow.
76 “ Geminatus, var. Jamaicensis, rare, f. p. Willow.
77 “ Excæcatus, common, f. p. Wild Apple.
78 Ceratomia Amyntor, not rare, f. p. Elm and Linden.
79 Daremma Undulosa, rare, one ♂.
80*Sphinx Rustica, rare, one ♂.
81 “ Carolina, common, f. p. Tobacco.
82 “ Celeus, common, f. p. Tomato.
83 “ Eremitus, rare, one ♂.
84 “ Plota, (Canadensis), rare two examples.
85 “ Chersis, rrae, one ♀.
86*Sphinx Jasminearum, rare, one ♂.
87 “ Hylaeus, common, f. p. Papaw.
88 “ Plebeia, rare.
89 Anceryx Ello, rare, one ♂.
90 Deilephila Lineata, common, f. p. Epilobium Coloratum.
91 Philampelus Pandorus, not rare, f. p. Grape and Five-leaved Ivy.
92 Darapsa Myron, common, f. p. Grape and Five-leaved Ivy.
93 Choerocampa Tersa, rare.
94*Deidamia Inscripta, rare, ♂ ♀.
95 Amphion Nessus, rare, f. p. Epilobium Coloratum.
96 Thyreus Abbotii, common, f. p. Grape.
97 Macroglossa Marginalis, common, f. p. various species of Honeysuckle.

98 Macroglossa Thysbe, rare.
98a " tenuis, rare, 3 specimens, f. p. Coral Honeysuckle.

ÆGERIADÆ.

99 Melittia Cucurbitæ, rare, ♂ and ♀.
100 Ægeria Lustrans, common in one locality.
101 " Pictipes, common, f. p. wild and cultivated Cherry.
102 " Acerni, common, f. p. Maple.
103 " Pyralidiformis, rare.

THYRIDÆ.

103a Thyris Maculata, rare.

ZYGÆNIDÆ.

104* Psychomorpha Epimenis, rare, one example.
105 Eudryas Grata, rare, f. p. Grape.
106 " Unio, common, f. p. Epilobium Coloratum.
107 Scepsis Fulvicollis, common.
108 Harrisina Americana, rare, f. p. Grape.
109 Pyromorpha Dimidiata, rare, three ♂.

LITHOSIDÆ AND BOMBYCIDÆ.

110 Hypoprepia Fucosa, common.
110a Euphanessa Mendica.
111 Crocota Rubicundaria, rare.
112 " Quinaria, rare.
113 " Ferruginosa, rare.
114 Deiopeia Bella, common in 1880, rare in other seasons.
115 " Bella, var. Speciosa, three examples.
116 Callimorpha Leconti, rare.
117 " " var., ? one example.
118 " Interruptomarginata, common.
119 Arctia Nais, common.
120 " " var. Decorata, two ♀.
121* " Virgo, rare.
122* " Saundersii, rare, ♂ ♀.
123 Pyrrharctia Isabella, common, feeds on anything.
124 Spilosoma Acræa, common, feeds on anything.
125 " Virginica, common, feeds on anything.
126 " Latipennis, rare, one ♂.
127 Hyphantria Cunea, common, feeds on anything.
128 " Cunea, var. Textor, common, feeds on anything.
129 Ecpantheria Scribonia, rare, five specimens.
130 Euchaetes Egle, common, f. p. Asclepias Cornuti, D. C.
131 Euchaetes Collaris, common, f. p. Asclepias Incarnata-L.
132 Halesidota Tessellaris, common, f. p. Sycamore.
133 " Caryæ, rare, two batches of larvæ on Hickory and Ash.
134 Orgyia Leucostigma, common f. p. trees of all kinds.
135 Euclea Querciola, rare, one ♂, Honey Locust.
136 Parasa Chloris, not common, f. p. Rose and Papaw.
137 Adoneta Spinuloides, rare, one ♂, f. p. Honey Locust.
138 Thyridopteryx Ephemeræformis, common, f. p. any kind of tree.
139 Lacosoma Chiridota, rare, one ♂ in collection Strecker.
140 Clostera Inclusa, common, f. p. Willow and Elm.
141 Apatelodes Torrefacta, rare, one ♂, f. p. Papaw.
142 " Angelica, rare, one ♂.
143 Datana Ministra, common, f. p. Linden, Elm.
144 " Integerrima, common, f. p. Walnut.
145 Nadata Gibbosa, not common, f. p. Oak and Maple.
146 Gluphisia Trilineata, rare, two examples.
147 Nerice Bidentata, rare, f. p. Elm.
148 Coelodasys Unicornis, common, f. p. Honey Locust.
149 " Leptinoides, rare, f. p. Walnut.
150 " Biguttata, rare, f. p. Honey Locust.
151 Heterocampa Marthesia, rare, one ♂, f. p. Oak.
152 " Marina, larvæ common on Sycamore, but very hard to rear.
153 " Manteo, rare, one ♀.
154 Cerura Cinerea, larvæ common on Willow, but hard to rear.
155 Telea Polyphemus, common, f. p. Oak, Linden, Rose and Maple.
156 Actias Luna, common, f. p. Walnut.
157 Attacus Cynthia.
158 Callosamia Promethea, common, f. p. Wild Cherry, Sassafras and Tulip Tree.
159 Samia Cecropia, common, f. p. Linden, Apple, Maple.
160 Hyperchiria Io, common, f. p. Ash, Willow, Red Clover.

161 Hemileuca Maia, common, f. p. Willow.
162 Dryocampa Imperialis, not rare, f. p. Sycamore.
163 Ceratocampa Regalis, rare, f. p. Hickory, Walnut.
164 Adelocephala Bicolor, not rare, f. p. Honey Locust.
165 Anisota Bisecta, rare, two ♂, f. p. Honey Locust.
166 “ Pellucida, rare, one ♀.
167 “ Rubicunda, rare, three ♂, one ♀.
168 Gastropacha Americana, rare, three ♀, f. p. Celtis.
169 Heteropacha Rileyana, common, f. p. Honey Locust.
170 Cossus Robiniæ, common, but not easily obtained, f. p. Black Locust.

NOCTUIDÆ.

171 Pseudothyatira Expultrix, two specimens at sugar.
172 Diphthera Fallax, one specimen at sugar.
173 Acronycta Occidentalis, not common.
174 “ Morula, rare, at sugar.
175 “ Lobeliæ, common, at sugar.
176 “ Radcliffei, one specimen at sugar.
177 “ Connecta, rare, f. p. Willow.
178* “ Furcifera, one example.
179 “ Americana, not common, f. p. Maple.
180 “ Rubricoma, not rare, f. p. Celtis.
181 “ Luteicoma, one example at sugar.
182 “ Noctivaga, not common, at sugar.
183 “ Afflicta, rare, at sugar.
184 “ Clarescens, very common, at sugar.
185 “ Hamamelis, rare, at sugar.
186 “ Dissecta, rare, at sugar.
187 “ Exilis, rare, at sugar.
188 “ Oblinita, common, f. p. Willow and almost anything.
189 Bryophila (Jaspidea) Lepidula, rare, at sugar.
190 “ Palliatricula, one ♀.
191 “ Teratophora, two examples.
192* “ Hebraicum, one example.
193 Microcœlia Diphteroides, rare, at sugar.
194 “ Obliterata, common, at sugar.
195 Agrotis C-Nigrum, common.
196* “ Bicarnea, one example.
197 “ Tricosa, common.
198 “ Herilis, common.
198a “ Subgothica, common.
199 “ Plecta, rare.
200 “ Cupida, rare, at sugar.
201 “ Alternata, not very rare, at sugar.
202 “ Brunneicollis, not very rare, at sugar.
203 “ Clandestina, common, at sugar.
204 “ Lubricans, rare, at sugar.
205 “ Messoria, common.
206 “ Friabilis, one example, at sugar.
207 “ Annexa, rare, at sugar.
208 “ Ypsilon, common.
209 “ Saucia, common.
210 Mamestra Latex, rare, one ♀, at sugar.
211 “ Adjuncta, not common, at flowers.
212 “ Legitima, not common, at flowers.
213 “ (Ceramica) Picta, not rare, f. p. Willow.
214 “ Grandis, rare, one example, at sugar.
215 “ Subjuncta, not common, at blossoms.
216 “ Confusa, rare.
217 “ Trifolii, common, at flowers.
218 “ Renigera, very common.
219 “ Detracta, common.
220 “ Laudabilis, rare, seven examples in 1881, at rest.
221 “ (Dianthœcia) Meditata, common, at flowers in the fall.
222 “ Lorea, common, at sugar.
223 Oncocnemis Saundersiana, two examples, at flowers.
224 Chytonix Jaspis, one ♀, at sugar.
225 Hadena Passer, two ♂, at sugar.
226 “ Devastatrix, common, at flowers.
227 “ Arctica, three examples, at sugar.
228 “ Sputatrix, not common, at flowers.
229 “ Apamiformis, one ♂, at sugar.
230 “ Lignicolor, common, at sugar.
231 “ Vulgaris, rare, at sugar.
232 “ Miselioides, not common, at sugar.
233 “ Chlorostigma, two ♂, at sugar.

234 Hadena Modica, common, at sugar.

235 " Vulgivaga, one ♀, at sugar.

236 " Rasilis, rare, at sugar.

236a' " sp. ? rare.

237 Homohadena Badistriga, larva common on coral honeysuckle, but nearly always ichneumonized.

238 Dipterygia Scabriuscula, common.

239 Hyppa Xylinoides, not very common.

240 Laphygma Frugiperda, one ♂, at sugar.

241 Prodenia Flavimedia, not common, at sugar.

242 " Lineatella, not common, at sugar.

243 Euplexia Lucipara, two examples, at sugar.

244 Brotolomia Iris, one ♂, at sugar.

245 Nephelodes Minians common in the Fall.

246 Hydrœcia (Gortyna) Sera, common, at sugar.

247 " Nitela, one ♀.

248* Achatodes Zeæ, not common, f. p. stems of Elder.

249 Scolecocampa Liburna, common, lives in rotten wood.

250 Leucania (Heliophila) Harveyi, rare.

251 " Commoides, common, at sugar.

252 " Unipuncta, common, at sugar.

253 " Pseudargyria, common, at at sugar.

254 Perigea Xanthioides, common, at sugar.

255 " Luxa, common, at sugar.

256 Amphipyra Pyramidoides, common, f. p. Grapes, Elm, and almost anything.

257 Orthodes Infirma, common, at sugar.

258 " Cynica, rare, at sugar.

259 Orthosia Ferrugineoides, two examples.

260 " Helva, common, at sugar.

261 " Lutosa, rare, at sugar.

262 Scopelosoma Walkeri, common, at sugar-water, in early Spring.

263 Xylina Cinerea, common, at sugar-water, in early Spring.

264 Cucullia Convexipennis, one ♂.

265 " Asteroides, rare.

266 Adipsophanes Miscellus, one ♂.

267 Crambodes Talidiformis, common.

268 Nolophana Malana, common, f. p. Wild Apple.

269 Aletia Xylina, rare.

270 Ingura Abrostoloides, one ♀, at sugar.

271 " Occulatrix, one ♂, at sugar.

272 Telesilla Cinereola, common, at sugar.

273 Plusiodonta Compressipalpis, common.

274 Plusia Aerea, not common.

275 " Biloba, rare.

276* " veruca. 2 examples.

277 " Precationis, common.

278 " Brassicæ, 2 examples.

279 " Simplex, common.

280 Schinia trifascia, rare.

281 Lygranthœcia Spraguei, one example.

282 Heliothis Armiger, common.

283 Pyrrhia Exprimens, not common.

284 Acontia Candefacta, common.

285 " Aprica, common.

286 " Erastrioides, not rare.

287 Chamyris Cerintha, common, at sugar.

288 Erastria Musta, one ♀, at sugar.

289 " Muscosula, common, at sugar.

290 " Carneola, common, at sugar.

291 " Apicosa, not rare.

292 Spragueia Leo, rare.

293 Galgula Hepara, three examples.

294 " Subpartita, not common.

295 Drasteria Erecthea, very common.

296 " Convalescens, rare.

297 Euclidia Cuspidea, common.

298 Parthenos Nubilis, rare.

299 Catocala Amica, f. p. Oak.

300 " Lineella, common.

301 " Minuta, not common.

302 " " var. Parvula, rare.

303 " Grynea, common.

304 " Fratercula, rare.

305 " Gisela, two examples.

306 " Amasia, rare.

307 " Cordelia, two examples.

308 " Dulciola, rare.

309 " Polygama, not common.

310 " Polygama, var. Pretiosa, not common.

311 " " var. Crataegi, not common.

312 " Illecta, common in 1880, rare before and since.

313 " Clintonii, rare, at sugar.

314 " " var. Helene, one ♀

315 " Serena, common, f. p. Hickory.

316 " Nebulosa, not rare.

317 " Habilis, f. p. Hickory.

318 " " var. Basilis, 1 ♀ ex. larva.

319 Catocala Innubens, common.
320 " " var. Hinda, common.
321 " Innubens, var. Scintillans, not rare.
322 " Paleogama, common.
323 " var. Phalanga, not common.
324 " Piatrix, not common.
325 " Neogama, common.
326 " Subnata, not common,
327 " Cerogama, not common.
328* " " var. Bunkeri, rare.
329 " Ilia, common.
330* " Ab. ? two examples, the black bands of secondaries connected.
331 " Parta, not common.
332* " Marmorata, one taken in 1881.
333 " Meskei, two examples in 1880.
334 " Ultronia, common.
335 " " var. Mopsa, common.
336 " Coccinata, not common.
337 " Amatrix, rare.
338 " Cara, common.
339 " Walshii, two examples in 1880.
340 " Judith, not rare.
341 " Epione, common.
342 " Robinsoni, common, f. p. Hickory.
343 " Robinsoni, var. Curvata, two ♀.
344 " Retecta, not rare.
345 " Flebilis, common.
346 " Vidua (Desperata), common.
347* " Viduata, two examples in 1881.
348 " Ulalume, rare.
349 " Lachrymosa, rare.
350 " var. Paulina, one ♂
351 " Obscura common.
352 " Insolabilis, common.
353 " Residua, common.
354 " Angusi, common in 1881, rare before.
355 " Angusi, var. Lucetta, common in 1881, rare before.
356 Allotria Elonympha, rare ♂ and ♀.
357 Spiloloma Lunilinea, common, f. p. Honey Locust.
358 Panopoda Rufimargo, rare.
359 " Carneicosta, rare.
360 Remigia Hexastylus, rare.
361 " Latipes, rare, one ♂
362 Celiptera Frustulum, not common.
363 Parallelia Bistriaris, not rare.
364* Agnomonia Anilis, one example.
365 Eutoreuma Tenuis, rare.
366 Zale Horrida, rare.
367 Homoptera Edusa, common.
368 " Saundersii, common.
369 " Lunata, common.
370 Homoptera, sp. ? rare.
371 Ypsia Undularis, rare.
372 Pseudanthroecia Coracias, rare.
373 Phalaenostola Larentioides, rare.
374 Homopyralis Tactus, common.
375 " Discalis, common.
376 Pseudoglossa Lubricalis, common.
377 " Denticulalis, rare.
378 Epizeuxis Aemula, common.
379 " Americalis, common,
380 Litognatha Nubilifascia, common.
381 Chytolita Morbidalis, common.
382 " Petrealis, common.
383 Zanclognatha Laevigata, rare.
384 " Ochreipennis, rare.
385 " Cruralis, rare.
386 " Marcidilinea, rare.
387 Rivula Propinqualis, common.
388 Palthis Angulalis, rare.
389 Phalenophana Rurigena, common.
390 Renia Discoloralis, common.
391 " Brevirostralis, common.
392 " Flavipunctalis, common.
393 Bleptina Caradrinalis, common.
394 Bomolocha Baltimoralis, one ♀
395 " Manalis, rare.
396 " Bijugalis, one ♀
397 " Abalinealis, common.
398 " Achatinalis, not common.
399 " Profecta, common.
400 " Deceptalis, not common.
401 " ? rare.
402 " ? rare.
403 Hypena Humuli, common.
404 Platypena Scabra, common.

GEOMETRIDÆ.

405 Eupithecia Miserulata, common.
406 Epirrita Perlineata, common in spring.
407 Cidaria Fluviata, common (Plemyra).
408 " Multiferata, one ♂ (Plemyra).
409 " Diversilineata, (Petrophora), common, f. p. five-leaved ivy.
410 " Intermedia, one ♀ (Rheumaptera).
411 " Latirupta, common, (Phibalapteryx).
412 Hydria Undulata, one ♀.
413 Heterophelps Harveiata, rare, ♂ and ♀.

414 Heterophelps Biguttata, common.
415 Zerene Catenaria, rare.
416 Häematopis Grataria, common.
417 Lythria Rileyaria, rare.
418 " Snoviaria, common, f. p. Honey Locust.
419 Thamnonoma Wavaria, f. p. Wild Gooseberry.
420 " Subcessaria, common, f. p. Wild Gooseberry.
421 Phasiane Mellistrigata, one ♂.
422 Semiothisa Ocellinata, rare.
423 Corycia Vestaliata, common,
424 Delinia Variolaria, common, f. p. Willow.
425 " Glomeraria, common in early spring.
426 " Septemfluaria, common in early spring.
427 Calothysanis Amatuaria, common, f. p. Dock.
428 Acidalia Insularia, rare.
429 " Nivasata, rare.
430 " Inducta, one ♂.
431 " Enucleata, common.
432 Dyspteris Abortivaria, rare.
433 Synchlora Rubivoraria, not rare.
434 Anisopteryx Vernata, common.
435 Phigalia Strigataria, one ♂.
436 Hibernia Tiliaria, 2 ♂.
437 Amphidasys Cognataria, rare, f. d. Honey Locust.
438* Biston Ursaria, one example.
439 Paraphia Unipunctaria, one ♀.
440 " Deplanaria, rare, f. p. Hickory.
441 Tephrosia Canadaria, common.
442 Boarmia Crepuscularia, common.
443 " Pampinaria, f. p. Honey Locust.
444 Bronchelia Hortaria, rare.
445 Hemerophila Unitaria, one ♂.
446 Nematocampa Filamentaria, common.
447 Hyperetis Nyssaria, common.
448 Plagodes Floscularia, rare, ♂ and ♀.
449 Angerona Crocataria, common.
450 Sicya Macularia, rare, one ♀ f. p. Ash.
451 Metrocampa Perlaria, rare.
452 Therina Fervidaria, one ♂.
453 " Seminudaria, one ♂,
454 Endropia Hypochraria, common.
455 " Pectinaria, rare.
456 " Obtusaria, rare.
457 Eugonia Subsignaria, common, f. p. Elm.
458 Caberodes Confusaria, rare.
459 " Var. Metrocamparia, common.
460 Tetracis Lorata, rare.
461 " Crocallata, rare.
462 Eutrapela Transversata, common
463 " Clematata, rare.

Geometridæ, 2 species unnamed.
Noctuidæ, 5 species unnamed.

Making in all 475 species and varieties taken in this locality.

Catocala sappho was seen last season by my friend Dr. H. Jewett, but unfortunately he was unable to take it.

Taking "at light" has never been tried here, and "sugaring" only part of one season; so I have no doubt that many species marked *rare* on this list will in time prove *common*.

Most of the Catocalæ have been taken on trunks of trees in the day time.

Many larvæ have been taken by "bush-beating," but I have been unable to rear the greater part of them, especially those that hibernate in the larva state and do not pupate till spring.

DAYTON, Ohio, *March* 14, 1882.

ÆGERIAN PARASITES.

BY HERBERT OSBORN, Ames, Iowa.

In the July number of "PAPILIO" Mr. G. H. French mentions the discovery of a parasite upon *Ægeria syringæ*, and it will be seen from the following notes that I have made observations that entirely agree with his in regard to the fact that *Ægerians* are parasitized. My first observation was made in 1878, when two chrysalids of *Ægeria syringæ*, found in branches of ash trees, produced each a perfect *Ichneumon*. A note in regard to this I published in Trans. Iowa Hort. Soc. for the year 1878. In 1880 I collected quite a number of larvæ and pupæ of *syringæ*, from young ash trees, to which they had done a great deal of injury. Of these nearly fifty per cent produced specimens of this same parasite, and an account of its work and appearance was published in a paper in the Trans. Iowa Hort. Soc. for 1880. The parasite appears somewhat later than the adult moth, and chrysalids containing parasites can readily be distinguished several days before their emergence. About the time when the adult moth might be expected an examination of the pupa case will show through its transparent walls another pupa, somewhat smaller, within it, the substance of the host being entirely devoured. The adult is black throughout, except joints, 11-16 of the antennæ, a frontal border, dot in front of tegulæ and base of anterior tibiæ, which are yellowish white; wings fuliginous. Length 60-70 in. It seems to me to correspond most closely to *Ichneumon malacus*, Say, and to the variety once described as *afer* by Cresson, but differs in having the front bordered with white and the anterior tibiæ white at base.

This, with the *Phæogenes ater* mentioned by Mr. French, makes two species (one of which, at least, is rather common,) which are now known to be parasites upon this *Ægerian.*

Mr. French is surely right in saying that the eggs are not laid after pupation of the host. Although I have not been able to ascertain positively, I incline to think the eggs are deposited in the larva in its early stages, otherwise the parasite must pass a large portion of its life, and hibernate, as adult, and then find its prey quite well protected.

In my notes upon this *Ægerian* I erroneously called it *denudatum*, being misled by Harris's account of that species.

I have also found a species of *Crabronidæ* in the burrows made by the larvæ, but suppose it simply occupies it after the *Ægerian* has vacated it.

ON CERTAIN PYRALIDÆ.

By A. R. Grote.

My kind friend, Mr. Goodell, has sent me a box of Massachusetts moths, among which are a few *Pyralidæ* of interest.*

Asopia Costalis. *Fabr.*

The specimen is the smallest I have seen, about half as large as is usual.

Arta Statalis. *Gr.*

This species seems to be common in Massachusetts. I have seen it in several collections.

Botis Plectilis. *G. & R.*

Common also in New York collections.

---

* A severe illness has prevented my examining my correspondence since my return from Europe until now.—A. R. G., May, 1882.

BOTIS ADIPALOIDES. *G. & R.*

The typical form with yellowish ground color. A variety has them white. I hardly think our own and Prof. Zeller's Texan specimens registered under this name really belong to this species.

BOTIS ABDOMINALIS. *G. & R.*

Belongs to the typical form, as illustrated by us. Hubner's *Argyralis* has the fore wings buff yellow and showing silvery marks. Here the exterior line is black and thread-like, enclosing here and there a minute white dot. Prof. Zeller's *Fracturalis* varies in color also and in size and position of the silver spots. That these all belong to one species has been suggested. Meanwhile the different forms are easily recognized and kept apart.

METREA.* n. gen.

Front flat. Maxillary palpi small, scaled. Labial palpi rather short; third article short, dependent. Tongue moderate. Vestiture mixed with flattened scales. Wings wide and ample. Fore wings rounded at apices with full external margin. Size above the average in the group. Veins three to five equidistant on both wings. Secondaries full. The species is thinly scaled, iridescent, white and pale yellow; the ample wings seem frail and tenderly colored. Ocelli present, small and well hidden.

METREA OSTREONALIS. n. s.

Fore wings very light yellow, almost white, with an oblique, nebulous, blackish mesial band, resolved into three large spots, the two lowest divided by vein 1. An exterior, sub-marginal, bent, blackish band, not obtaining above vein 6. The external median line is indicated on costa, and is indistinctly continued till it touches the lower of the mesial blotches. Fringes white. Hind wings white, glistening, with a pretty purplish iridescence. Tegulæ white. Head, dorsum of thorax and also the abdomen above, blackish. Segments narrowly edged with white. Beneath white, fore legs fuscous inwardly. Amherst, Mass.

In my collection is a New York specimen of this fine species, hitherto unlabeled by me. It departs from the Botyde genera by the blunt primaries, and should find its place near the close of the series of *Pyralididæ*. The small, conical, dependent, third palpal article is apparently naked.

ARGYRIA AURATELLA. *Clemens.*

Professor Fernald's table of the species of *Argyria*, "North American Entomologist, I., 102," is most useful to determine the different kinds. *Auratella* is apparently more common in collections than its near ally *Pulchella*.

CRAMBUS DISSECTUS. *Grote.*

The specimen has the outer white spot, beyond the mesial notched stripe, a little smaller than usual. From the white vertex and thoracic disc, this species is allied to *Interruptus*.

---

* Gr.: *μετρεῖν*.

CRAMBUS TOPIARIUS. *Zeller.*

This interesting species represents the European *Hortuellus*, in our fauna, according to Prof. Zeller. It is widely distributed.

ON THE AMERICAN FORM OF PAPILIO MACHAON, LINN.

BY W. H. EDWARDS.

Some years ago, by the kind aid of Mr. W. F. Kirby and Dr. Hagen, I was able to bring together a long series of *Machaon* and its varieties from many localities in Europe, also from India, Himalaya, Central Asia and Kamschatka. From America I have several examples from Hudson's Bay and Alaska, and have examined a specimen taken at the Dalles, Columbia river, by Mr. Henry Edwards. On comparing the American examples with those first mentioned, I find that they, as a whole, differ considerably from most of the others, but come nearest, and indeed are very near to the variety from Himalaya, labeled in the collection of the Mus. Comp. Anat., Cambridge, "*Asiaticus, Ménétriés.*" This variety was characterized as having a very broad marginal border to the hind wings, the inner edge of which border was straight and reached nearly to the end of the cell. Emphasis is placed on the straightness of this edge, as if it was the principal character by which the variety was to be known. Ménétriés, Desc. des nouvelles Espéces de Lep. Diurn., etc., St. Petersburg, 1855, p. 69, gives P. *Machaon*, var. *Californica*, syn. of *Zelicaon*, Lucas, (*Zolicaon* Bd.); and next, var. *Asiatica*, describing this last as follows: "Cette variété différe du *Machaon* d'Europe en ce qu'en dessus les secondes ailes ont la bande noire postérieure tres large et bien limitée; celle-ci part du bord anterieur et se dirige en ligne *droite* (so in italics) alteignant presque la cellule discoidale, jusq' à la lunule anale. De l'Himalaya et du Kamtchatka. N. B. Les individus d l'Himalaya présentent de plus, la bande noire du bord posterieur des premiéres ailes beaucoup plus large."

One of the two Himalayan examples examined by me answered very nearly to this description, but the inner edge of the broad border of hind wing was not straight, but wavy, and was slightly concave. Also, it did not approach the cell very closely in consequence of its concave outline. The other example had that edge still more concave, and it was irregular, and was precisely like several of the examples from Europe in these respects. Two males (only examined) from Kamtchatka were small, and the borders of both wings were very narrow, while on the hind wing of each the inner edge of the border was unusually concave, so that the distance of same from the cell was greater than in any others examined.

Felder, Spec. Lepid., 1864, p. 26, gives *Asiaticus* Ménetr. as var. of *Machaon*, and in explanatory note, p. 75, says that the hind wings are shorter than in the typical *Machaon* and more produced in the anal region. He gives the localities as India and Himalaya, and queries whether the Kamtchatkan form is the same thing.

It seems to me that the name *Asiatica* of Ménétriés does not apply to the prevailing type in Southern Asia, but only to a certain variety of same, in which the edge of the border of hind wings is straight and placed very near the cell, and that the prevailing type is so far unnamed.

Mr. Scudder described P. *Aliaska* in Pr. Bost. Soc. N. H., 5, p. 45, 1869, as a distinct species, and compared it at length with P. *Zolicaon*, Bd., for its justification. Of course, as compared with *Zolicaon*, it is distinct, but the comparison should have been made with the Asiatic *Machaon*.

So far as I am able to discover from the examples under view, the American form differs from the Himalayan and all the old world types, 1. In having the hind margins of the fore wings decidedly convex, often largely so, and that in both sexes, which is owing to the shorter costal margin in the former. In other words, the fore wings of the typical *Machaon* are more produced. 2. The black parts are more intensely colored, and less dusted with yellow scales, and the nervures and branches, particularly on secondaries, and the median nervules of primaries, are very considerably edged with black. In most of the old world examples the hind wings have no black except at end of cell, and on the median nervure against cell, so that the wing is divided into a yellow area, which includes the base and disk, and a black area, namely, the marginal border. The Himalayan examples resemble the American in this respect. The same difference holds on comparing the lower sides; that is to say, the American form is more melanic than the old world forms, excepting the Himalayan. If M. Ménétriés had not limited his *Asiatica* to the examples which have a straight edge to the inner side of the marginal border of hind wings, probably his name should cover the American form. But, as he saw fit to limit it, I think the usual Himalayan type is unnamed, and the American certainly may be designated as *Aliaska*, Scudder. There is a great uniformity between all the American examples under view, viz., four from Hudson's Bay and eight from Alaska. Mr. Scudder says sixteen specimens were obtained by Lieut. Dall, and we may infer that he examined them and found them essentially of one type, as he says nothing of differences. Moreover, he had at same time one of my Hudson's Bay specimens, and alludes to it as being like the others.

Machaon seems to have been first noticed on this continent by Mr. C. Drexler, who traveled in British America, under the auspices of the Smithsonian, in 1860, and from him I received the specimens which I now have. Mr. Drexler told me that they were taken at Rupert House, and were picked off the gooseberry bushes in early morning, while stiffened with the cold; also, that the species was abundant there. Lieut. Dall took his examples at Nulato, May 20th and 24th, and others June 5th and 14th, about the Ramparts. Mr. Turner and Mr. E. W. Nelson found the species common at St. Michael's, on the coast above the outlet of the Yukon River, and Mr. Henry Edwards has taken one example at the Dalles, Columbia River.

Machaon is found throughout Europe, from Lapland to the Mediterranean; also in Northern Africa and Egypt, and throughout Asia to Pekin, and from India to Siberia; also in Japan, the examples found there not differing much from those found in the Netherlands, as De Haan states. Keferstein, Stett. Zeit., vol. 30, p. 211, 1869, says that *Machaon* in the Alps flies at an altitude greater than 5000 feet, and in the Himalaya at 9000 feet. It seems adapted to every climate, and is the only Papilio known to fly over the subboreal regions of both continents. Nevertheless it has not been taken south of the northern boundary of the United States so far as recorded, except in the single instance above spoken of on Columbia River. Mr. Morrison, who collected in that district two years ago, did not see it, nor did the late Mr. Crotch, who collected at Vancouver's Island, and in British Columbia as far to the north as Bald Mountains, bring back any examples of *Machaon*. This is in strong contrast to its wide distribution in Europe, Asia and Africa. Hoping to naturalize the species here in West Virginia, I turned loose more than 100 butterflies last year, which came from a lot of chrysalids imported from Germany by Mr. T. L. Mead. But a day or two after they were freed they had disappeared. I hoped to see some of them again this spring, flying with *Turnus* and *Trolius*. These last species are flying abundantly as I write, but no *Machaon* has presented itself, and I have little hope of the success of the attempt to introduce them.

In the Entomologists' Monthly Magazine for April, 1882, vol. 18, is an admirable description of the preparatory stages of *Machaon*, by Mr. Wm. Buckler, and inasmuch as no adequate description, especially of the larval stages, was ever in print before, I have asked the editor of "PAPILIO" to give this to his readers. It is not likely that the present generation of lepidopterists will have the opportunity of breeding the American form of the species—not till the steam whistle is heard at Hudson's Bay, or Alaska and Behring's Straits become summer watering places. And it is highly probable that all the preparatory stages of the American form will, when hereafter observed, be found identical in color and markings with the Asiatic or the European. I do not mean to say that the larva of *Machaon* has not been described, for, indeed, it has often, but not with regard to its several moults. Until recent years it was thought sufficient to describe, and usually in general terms, the adult caterpillar, or at the most, to describe without regard to moults, as young, half-grown, three-quarters grown, etc., and until Mr. Buckler bred *Machaon*, as he relates, in 1880, with the express desire of ascertaining the number of moults the species was subject to, I, for one, could get no definite information on the matter. Several old authors had stated that there were four, as Chr. Schwarz, 1791, C. Valoren, 1859, as Dr. Hagen informed me; but later ones, to whom I had access, gave no definite information about it, and two well-known entomologists to whom I applied thought the number was but three. Mr. Buckler's paper has the credit of clearly establishing the number of moults in *Machaon* and for the first time carefully describing them.

"TINEIDÆ" OR "TINEINA."

By Thomas, Lord Walsingham, F. Z. S., Etc.

In a paper published in the Journal of the Cincinnati Society of Natural History for April, 1882, vol. v. p. 5, Mr. V. T. Chambers discusses the antennæ and trophi of Lepidopterous larvæ, offering the results of his observations "as suggestions to systematists of the Lepidoptera" which "may aid somewhat in their classification, especially in that of the Tineina." He then writes, "these do not constitute a family in the sense that the Noctuidæ, Geometridæ, etc., are families. The Tineina is (*sic*) a large group of many families, some of which seem to me to be as far removed from each other in a natural system as they are from any of the Macro-Heterocera."

In a foot-note at the bottom of page 5 we read: "I have sometimes been asked why I used the name Tineina instead of Tineidæ. I trust the above remarks afford a sufficient answer. Besides, 'Tineina' is the term adopted by the editors of the 'Natural History of the Tineina,' the standard work upon the group."

Although the precedent quoted by Mr. Chambers is rightly entitled to respect, there are certain rules generally recognized among naturalists of all countries by which, for the sake of uniformity, it is most desirable to be guided. Probably the best modern authority that can be quoted upon this subject is to be found in the "Rules of Zoological Nomenclature by Hugh E. Strickland," originally drawn up by a committee of the British Association in 1842; revised, corrected, and reprinted, by their authority, in 1863 and 1878.

These "Rules" consist of a "Series of propositions for rendering the nomenclature of Zoology uniform and permanent." Turning to p. 23 and p. 17 respectively of this pamphlet we find:

"[Families to end in *idæ* and subfamilies in *inæ*.] The practice suggested in the following proposition has been adopted by many recent authors, and its simplicity and convenience is so great that we strongly recommend its universal use:—B. It is recommended that the assemblages of genera termed families should be uniformly named by adding the termination *idæ* to the name of the earliest known, or most typically characterized genus in them; and that their subdivisions, termed *subfamilies*, should be similarly constructed, with the termination *inæ*." Thus, if this rule be accepted, it follows that the appellation "Tineina" should be applied to a *sub*family, and should indicate a division inferior rather than superior to the family Tineidæ. Mr. Chambers, however, rests his claim to the use of the term "Tineina," in the sense adopted by him from the authors of the 'Natural History of the Tineina,' upon the ground that the various genera or groups of genera which it has been made to include do not constitute in themselves a natural family.

Alluding to the old subdivision of the group into two families, Tineidæ and Hyponomeutidæ, by Stephens, he writes, "It would be, perhaps, even more unnatural to put them all in a single group of Tineidæ. Mr. Stainton's system, in which the name Tineidæ is retained for the restricted family containing *Tinea* and its allies, is the best classification of the group with which I am acquainted."

The only objection now raised against Mr. Stainton's use of the name "Tineidæ," as strictly indicating a *family*, is that it should not be made subordinate to the name "Tineina," the termination of which, by the British Association rules, is such as to indicate an inferior subdivision.

There are in this case two alternatives open to those who desire to conform to the generally accepted rules of nomenclature quoted above. The first is to adopt the names of the various families in the sense in which they are used by Mr. Stainton and others, and to change the name of the group from Tineina to Tineimorpha, Tineoidea, or such like. The second is to adopt the name Tineidæ, in lieu of Tineina, for what is now usually regarded as a group of families, thus treating them as constituting one family, and to designate the existing families as subfamilies with the termination *ina*, now used with doubtful propriety for the whole group to which they belong.

If we would inquire into the merits of these two alternatives, the first point to be considered is, what is a family?

Regarding it in the accepted sense as an "assembly of genera," each of which possesses, in greater or less degree, the characteristic feature or features of one and all of them, we must ask ourselves whether any one or more than one characteristic generic feature pervades the whole group of genera which have of late been massed together under the name "Tineina."

It is undoubtedly true that great diversity is to be found in the characters which they present; for instance, in the presence or absence of tongue, ocelli, and maxillary palpi, in the form of the wings, and in the structure of the labial palpi and antennæ. Nevertheless it is surely far easier at first sight to separate any of these genera from those of other families than it is to determine, with readiness and certainty, the true position of a Bombycid (which approaches the Noctuidæ), a Noctuid (which approaches the Pyralidæ), or a Pyralid (which approaches the Phycidæ).

Whether by their small size, their long cilia, or their slender and upturned palpi, by the leaf-mining habits of their larvæ or the neuration or ornamentation of their wings, there is in each genus associated with the Linnæan name "*Tinea*" some peculiarity by which its members can without difficulty be recognized as possessing what may, I think, be properly called a family resemblance.

Without at present entering into an elaborate analysis of these resemblances to test the question of how far they may or may not be regarded as of "family" value, it will not be denied that they are far more easily grasped than are those more uniform generic characters upon the strength of which the various existing families have been founded.

There is considerable divergence of opinion between different authors as to the family position of several well-known genera; and, on the whole, it would be perhaps the safest course to adopt the name "Tineidæ" as a family definition coextensive with the "Tineina" of Stainton and other authors, thereby securing a termination uniform with that of the Sphingidæ, Bombycidæ, Geometridæ, Noctuidæ, etc., and to regard the present families as subfamilies, adopting for them the proper termination of such divisions, as Tineina, Hyponomeutina, Adelina, Gelechina, and so forth.

It will scarcely be objected that any necessity for further subdivision except into genera and species has yet arisen or is ever likely to arise.

FOOD PLANTS OF SAMIA COLUMBIA.

From a paper read before the Natural History Society of Toronto, by W. Brodie.

This species is common in the Muskoka, Nipissing and Lake Superior districts, and extends beyond the height of land towards James's Bay. It no doubt feeds indiscriminately on our coniferous trees as well as many deciduous trees having a northern range. It is very rare in Southern Ontario: those found are probably the product of fertilized females straying from their habitat in the north.

Spiræa tormentosa, L.
Ulmus Americana, L.
Abies nigra, Poir,
Abies alba, Michx.
Abies canadensis, Michx.
Abies balsamea, Marshall.
Larix Americana, Michx.

TWO NEW GEOMETRIDS FROM MR. NEUMOEGEN'S COLLECTION.

By A. R. Grote.

CHLORASPILATES ARIZONARIA. n. s.

♂ ♀. Fore wings dull green, with the costa ochrey, and two ante-apical costal brown dots in the places of the mesial shade and external line. A minute ringed discal dot. At the place of the sub-terminal line two or three superposed brown dots at costa before apices. Hind wings ochre powdered with red, and with a red mesial line and discal dot. Beneath ochre, irrorate with red. Head ochrey. Thorax greenish. Abdomen ochrey. This seems to be larger than the Texan *Bicoloraria*, and to differ by the discal marks and absence of external or other lines on primaries. The pectinate antennæ of the male have also the stem distinctly whitish, as it is in the simple ones of the female. Tucson; several examples. Notwithstanding the differences, we may only have to do with a variety.

EUCATERVA. n. gen.

Allied to my genus *Caterva*.

Male.—Labial palpi of unusual length, extended forwards and upwards, curving slightly. The relatively short third article is of the same thickness with the long, closely scaled linear second joint. No ocelli. Eyes naked. Front flat. Labial palpi projecting forwards about as far again as the head is long. Male antennæ bipectinate, with thick, ciliated branches.

Female.—Labial palpi shorter; about half shorter and slenderer than male. Antennæ simple. Body soft and somewhat heavy.

The vestiture is close and evenly laid on, consisting of flatish scales. Wings entire; both sexes winged.

EUCATERVA VARIARIA. n. s.

♂ ♀. White. Size of *Cleoria Pulchraria.* The males are white, thickly sprinkled with blackish, with straight outer and curved inner thick mesial lines and discal dot, much the ornamentation of *Glomeraria.* Hind wings paler, unlined with dot.

The females have the lines wanting and vary by being all white, with black dots sprinkled over external margin and on costa at base of primaries, as well as on the collar and vertex. Palpi black and white. Some females have the primaries widely black, leaving costal edge and inner margin white. The white fringes of primaries are dotted with black. Several specimens from Tucson.

Obituary.

CHARLES ROBERT DARWIN, F. R. S.

On the 20th day of April last a shadow fell upon the earth, and a wail of sorrow went up from the homes of science, for the news flashed around the world that the great naturalist was dead. In this place we desire to do no more than record our loss and to fulfil a duty we have laid down for ourselves of briefly noticing the departure of all who have in any way belonged to the ranks of our association. Mr. Darwin was early nominated an honorary member of the New York Entomological Club, and expressed a warm interest in its purposes. In a letter received from him during the past year, he says: "I like 'PAPILIO' very much, and, though I am not specially an entomologist, it seems to me to be established on a wise principle of investigation, and you will probably do better work by concentrating your inquiries. I wish for it and your society every success." To say one word in praise of a man so worthily honored would be, on our part,

"To gild refined gold."

We would only add our mite of sorrow to the universal grief which the world has laid at the shrine of departed genius and worth, and twine our humble leaf among the laurels placed upon his tomb.—H. E.

NOTES ON LEPIDOPTERA.

NOTES FROM MONROE CO., N. Y.—*Scepsis Fulvicollis.* This species appears to be more nocturnal than most of its family. I captured several in fine condition at sugared trees from the middle of September to the middle of October, last season.

Selenia Kentaria. Several males of this species flew into my room (close to a large wood) the end of April and the beginning of May. The date apparently indicates that, like its European relatives *S. Illunaria* and *Illustraria*, it is double brooded.

Marmopteryx Strigulata. This insect is not uncommon in beech woods near Lake Ontario, in September, but from its habit of resting on the ground and its low, quick flight when disturbed, it is not easily captured. I took five one day and saw many others. Its peculiar neutral tint renders it difficult to distinguish on the wing.

Epirrita Dilutata. I met with this species among low bushes near the lake the end of October. I captured several, and it is apparently common there.—DAVID BRUCE, April 14, 1882.

ACTIAS LUNA.—A fine and fresh ♀ example of this beautiful moth was taken on Staten Island, May 3, by Mr. Prentice Mulford, of the New York *Graphic.* Is not this very early for the appearance of the species?—EDITOR.

MR. A. R. GROTE'S COLLECTION.—It will be a subject of universal regret among Lepidopterists that this collection, containing over 1200 types of North American species, should have been suffered to leave this country. It has found its resting place in the British Museum, and though it will, in some respects, be fittingly placed, and will be under the worthy charge of that able entomologist, Mr. A. G. Butler, it should, nevertheless, have remained in the United States as a reference for future students. Had the collection been composed of old engravings, broken china, or even of minerals and fossils, it would readily have found a purchaser here. Why should the most useful and practical branch of natural history be so ignored as it is by our men of wealth, and when will the first steps be taken in New York to found what would be one of its most instructive attractions, a Museum of Entomology?—EDITOR.

OCCURRENCES OF LEPIDOPTERA AT SEA.—To the chief officer of the ship Thalia—Mr. Zielke, recently in the port of San Francisco—I am indebted for two large noctuæ allied to *Erebus odora,* which were taken on the 3d of December last at sea, in latitude 37° south, longitude 52° west, which places the locality off the mouth of the river La Plata, in South America, about 250 miles from the nearest land. He also informed me that there were many others round the lights in the cabin at the time these were captured. There is no reason to doubt these facts, as I went to the ship's log-book to ascertain the exact locality, and there found a record of the circumstance. The occurrence is of interest as showing the facility with which insects may be carried from land to land, across apparently impassable distances.—R. H. STRETCH. SAN FRANCISCO, *April* 16, 1882.

LARVA OF GNOPHÆLA HOPFFERI.—As showing the probable position of this species in a natural classification, the following extract from a letter received by me from Lord Walsingham, when he was on his way to England from the Pacific Coast, several years ago, will prove of interest: "I send a single specimen of an insect emerged from the chrysalis to-day, July 16, from pupa in one of my bottles. The larvæ of this species, feeding on a species of *Myosotis,* were not uncommon on the summit of the Siskiyou Mountains (Northern California) in June. They were undistinguishable from, or at least very closely resembling, the larvæ of *Callimorpha dominula.* but perhaps somewhat brighter in color. I have not seen the insect before." The insect was G. Hopfferi, Grote.—R. H. STRETCH.

EMERGENCE OF BOMBYCIDÆ.—I have found the imagos of *P. cecropia*, *F. Polyphemus*, *C. promethea* and *A. luna* to emerge from the cocoons in the forenoon, usually about 10 A. M.—*C. promethea* somewhat earlier. In every case where the emergence occurred in the afternoon, it could be traced to some abnormal condition. The lapse of several hours is required for the development of the wings and generative organs, so that when darkness comes the females may be sought and fecundated; in warm nights this takes place, and many ova are deposited before morning; if the temperature falls they usually remain in coitu during the night.—W. BRODIE, Toronto, Can.

ADONETA SPINULOIDES.—On August 17, 1880, I secured twenty-two richly-colored, singular-looking larvæ from a small plum tree in my garden. They were placed in a glass box and fed upon leaves from the plum. In a few days the most of them had made their small, parchment-like and nearly spherical cocoons. Of this large number but one reached the imago state, revealing, on the 25th of December, the bronze, drab-shaded, fringed and tongueless *Adoneta Spinuloides*, a pretty moth, but by no means so richly-colored as its larva. Three of these larvæ were secured the next summer (Aug., '81), two of which were destroyed by ichneumons, and but one cocoon was saved. This opened April 14, '82, having remained in the chrysalis some months longer than the one of the previous year, although kept in the same place and with the same temperature. The prevailing color of the larva is pea-green. On a yellow ground, down the back, are five diamond-shaped purple spots. Across each one of these larger diamonds are strap-shaped lines, buttoned at either end. The sides of the larvæ are spined. The spines are yellowish scarlet (or more nearly the color of the watermelon core). There are eleven pairs of spines—the three pair in front and the last three pair being larger than the intermediate ones. All of these spines are again spined with hair-like, pea-green spinelets. Examining one of these larvæ with the microscope, one readily arrives at the conclusion that a greater amount of fine work could scarcely be crowded into so small a space, the largest specimen not exceeding three-fourths of an inch in length.—MRS. JULIA P. BALLARD, Easton, Pa.

ON THE MOTION OF THE WINGS IN DRYING IN PLATYSAMIA CECROPIA.—Both hind wings are brought together by their inner margin and then elevated together with the front pair, then shoved up behind the front pair; then the hind wings are brought down and their inner margins are brought together and the process is repeated.—AUG. R. GROTE.

ON SOME GEOMETRIDÆ FROM DAYTON, OHIO.—The male of *Floscularia*, now sent me by Mr. Pilate, has the antennæ pectinate. Two specimens of *Glomeraria* have the wings much darker, and an inner band on primaries not noticeable in my type. Three specimens of *Septemfluaria* have only the three ochre lines on fore wings and two on hind wings visible. The external line and blotches are obsolete.—AUG. R. GROTE.

FANS ON THE FORELEGS OF CATOC. FRAXINI. In the Entomologists' Annual for 1871, p. 75, Dr. Knaggs writes: "*Catocala Fraxini* has visited the Regent's Park, and this reminds me that the sight I had of this specimen (alive) taught me something of which I was previously entirely ignorant, viz.: that the creature is endowed, for some inscrutable reason, with large fans (or rather in this particular instance with a large fan) on its forelegs, after the fashion of some *Geometridæ* and *Pyralidæ*." I may add that the structures are very common among the *Noctuæ Quadrifidæ*, though they are frequently retracted, and therefore liable to escape observation. Lepidopterists believe them to be organs connected with the production of a peculiar odor, differing possibly in each species. Tufts of hair, probably homologous in function, occur on the antennæ, or at the base or extremity of the abdomen, of many Lepidoptera, but the present subject is one that has only recently attracted the attention of Entomologists.—W. F. KIRBY. BRITISH MUSEUM.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] June, 1882. [No. 6.

SOME POINTS IN THE NATURAL HISTORY OF PAPILIO MACHAON, L.

By William Buckler.

[Reprinted from the "*Entomologists' Monthly Magazine*," London, April, 1882.]

Contrary to our usual custom, we reprint the following admirable paper, in the belief that it may be of service to those who in this country are studying the life history of our butterflies. It is needless to say anything of the value of Mr. Buckler's careful observations. They will speak for themselves.—Editor.

In offering my notes on the history of this species, I know I am going upon ground to some extent already well trodden, and it is, therefore, not on the plea of telling anything quite new that I put them forward; but, knowing that there is now, more than ever, an interest felt in obtaining exact information as to the process of growth or development in the earlier stages of various forms, and being conscious that I have done my best in this case, I still hope that my work may be of use; I only wish I could impart to others anything approaching the pleasure I myself felt in watching and recording what follows.

In 1868, I had reared the larvæ from two eggs found in Burwell Fen by Mr. W. R. Jeffrey, and two more in 1871, from eggs found by Mr. C. G. Barrett, in Horning Fen, and had taken several figures in either case, but when in 1879 Mr. W. H. Edwards, of Coalburg, West Virginia, put some questions to me on the number of moults and other points connected with them, I found I could not give such positive answers as I could have wished.

I determined, therefore, to rear the larva, if possible, again, and Mr. W. H. B. Fletcher most kindly helped to bring my project within range of possibility by sending me three eggs, on June

4, 1880, which he had found the day before in Wicken Fen, and on the 12th a few more, laid on *Peucedanum palustre*, and eventually three of these proved infertile.

Of course what follows is really the personal history of the individuals which I watched, and though for convenience sake I shall generalize, and sometimes use the present tense and not the past, I wish it to be understood that I speak only of what I was aware I saw; I know I made one omission, which will be noticed in its proper place.

The eggs hatched June 13th–15th, the larvæ in every case making their first meal on the empty shell, and for a day or two I supplied them with garden carrot, but after that they were fed entirely on *Angelica sylvestris;* from first to last each larva was kept separate, and its changes noted in a separated record.

The larva, on first turning its attention to its food plant, scoops out a round cell on the surface of a leaf, but after a few hours takes the bolder course of eating quite through from the edge of the leaf; it does not roam, but continues at the same part till the third or fourth day, when it moves off to some distance and, on a stalk or leaf, spins a few silk threads for a foothold; there it waits from two to three days for the first moult, and when this is accomplished eats the cast skin all to the head-piece, and soon after goes—apparently by design—back to the spot where it was previously feeding, and attacks the leaf again: at this stage I noticed if a larva found a speck of grass on its food, it would pick it up in its jaws, stretch out its body, and somehow project the grass away from the plant: again, after feeding three or four days it retires as before, and prepares for and accomplishes its second moult, which happens on about the twelfth day of its life; similarly the third moult comes on the sixteenth or seventeenth day, and the fourth (the last) from the twentieth to the twenty-third day, the cast skin being always eaten; after the last moult the larva feeds on for ten or twelve days, consuming a great quantity of food and making very rapid growth. I may here note that its usual attitude in repose is from the very first much like that of a *Sphinx*, with the neck arched, and the head bent down. The earliest age at which I *noticed* the curious horns of the second segment was when I touched the larva *just after* its *third moult*; they were then much longer and thinner than they became after the fourth moult; but there accompanied their protrusion a drop or two of clear greenish liquid, and a most penetrating odor, which reminded me of an overkept decaying pine-apple: after the fourth moult the horns were of a shorter and stouter character, but I noticed that when I was holding a larva between my finger and thumb it had the power to lengthen one horn at the expense of the other (which became shorter), so as to manage to touch my finger with it; the horns are extremely soft and flexible. When full grown the larva ceases feeding, and rests for a while, and then commences its preparations for pupation by selecting a stem, and spinning on it from side to side a number of threads to ensure a good foothold; next, lying along these threads head downwards, it spins at the bottom of them a broad cone of whitish silk, having a sharpish apex; then turning round it creeps up the stem a little, and with the anal legs feels about till they find this cone, when they are placed close together on the stem, but touching the base of the cone, and a slight pushing motion is visible by which their circlet of hooks is fixed in the silk spun on the stem: its tail end being thus fixed, the larva stretches out its head and front segments, lifting up at the same time the first and second pairs of ventral feet, and bends itself backwards in a wide sweep from one side of the stem to the other, as though to be assured there is free room for its movements; it next—while in this semi-detached attitude—and with its thoracic legs rigidly extended, throws back its head, and in this way swells out its breast, like that of a pouter pigeon, leaving a deep hollow between the mouth and the first pair of thoracic legs; then it bends to one side of the stem and spins a broadish attachment for the first thread of the cincture, and presently with a slow and deliberate motion sweeps round as before to the other side, the head all the while wagging as the silk issues from the spinneret and is guided along the hollow above mentioned; as the head approaches the other side the body swells out still more as though to stretch the thread, and give it the necessary curvature; as on commencing the thread, so now on fastening it to the other side, there is a delay for a little, and the fastening seems to be made with a more liquid and glutinous quality of silk than the rest of the thread: the first thread thus completed, the larva proceeds in the same slow and methodical manner—spinning some thirty threads from right to left, and as many from left to right—or sixty altogether for the cincture, the time thus occupied being about one hour and forty-five minutes; occasionally the first pair of thoracic legs seemed to be called in use to assist at the fastening of the ends of the threads: when enough threads have been spun the larva seems to test their strength by pulling them quite taut with its projecting breast, two or three times, and then apparently satisfied, it bends down its head to put it under the cincture, and creeps up inside it till it hangs loosely round its back between the sixth and seventh segments: next it seems to relieve itself by stretching upwards all the front segments that had been so engaged during the spinning, and in a few minutes settles into a quiet posture with head bent down and legs brought close to the stem; thus it rests, and meanwhile the segments of the body shorten, and their divisions deepen; the head becomes bent down close to the stem, while the body is held away from it as far as the cincture allows—drawn tight as it is into the deep division between the sixth and seventh segments, so that only the head and tail are in contact with the stem; at the end of about a day and a half suddenly the head and front segments are jerked backward four or five times in succession; next the belly is brought close to the stem and the head held up, and then in about five minutes the skin splits open behind the head on the top of the back, and the pupal thorax appears bulging out; presently is disclosed the top of the head, then the upper part of the face, and with a few nodding motions the head is freed, and the skin slowly but easily slides downwards from each side (the cincture causing not the least impediment), and as it goes drags away like little threads the linings of the spiracles; presently from out of the collapsing skin is disclosed the tip of the tail, and there is just time allowed for the observer to see that it is quite *hollow*, when in another moment it is fitted upon the *cone* of silk, and strongly pressed down, and with a repeated half screwing motion the attachment is made complete; meanwhile the moisture which exudes from the pupal surface has surrounded and fairly embedded the cincture at its line of contact with the back; the old shriveled skin now rests in a heap between the lower part of the abdomen and the stem, but is presently, by a slight twisting movement on the part of the pupa, caused to drop off; the head and thorax gradually develop themselves, the former into two largish blunt diverging processes, the latter into a central bluntly projecting eminence, with another on either side; the larval tubercles remain as small blunt conical protuberances, the wing-covers form an angular outline, and the back becomes dull and rough; just four minutes elapse from the bursting of the larval skin to the full disclosure. (Here I must express my regret that I forgot to look for the connecting membrane which was discovered in *Pieris* and *Vanessa* by Dr. Osborne, and described in vol. xv, p. 59, of this Magazine.)

The egg of *Machaon* is globular, having a depression at the base in contact with the leaflet on which it adheres; it is of a good size and with apparently smooth surface, and when first laid is of a greenish-yellow color, quickly turning green, and soon after tinged with violet-brownish, gradually deepening to purplish, and faintly showing the embyro through the shell, which in a day or two turns entirely purplish-black, a process of change similar to that shown by a ripening black currant; the shell next assumes a light pearly transparency, and the dark embryonic larva coiled round within is plainly visible, and in a few hours hatches.

The newly-hatched larva is 3 mm. long, stoutish, with shining black head and black velvety body with dark green segmental divisions, and conspicuously marked with a patch of creamy-white on the seventh and eighth segments; the pale pinkish tubercles, in some instances yellowish, rather bristly, are in two rows down either side, and in about eight hours turn dark drab, and in a day or so blackish like the third row beneath, except those on the white patch, which remain white.

After the first moult, in three days the length is 8 or 9 mm., the stoutness in proportion; the head black, and the body velvety-black, bearing two orange dots on the front margin of the second segment, the shining, rather pointed, black tubercles having their bases reddish-ochreous, after being for a day or so green; the white patch as before, but now bearing black tips on the tubercles.

After the second moult the length by the third day has increased to 14 mm., with increase of stoutness; the black shining head is marked on the face with a yellow chevron, and with pale yellow upper lip and bases of papillæ; the black velvety body has the white patch yet more conspicuous and encroaching a trifle on the ninth segment; the front dorsal margin of the second segment is marked with orange-yellow, and minute twin dorsal bright yellow dots are on the third and fourth, and a faint narrow transverse divisional streak of yellowish or grayish between them; other similar short streaks occur on the ninth and tenth. Of the three rows of conical black tubercles on each side of the body, the two top rows have their upper bases half ringed with bright orange color (excepting those on the white patch, which have pale yellow), the lower third row have orange bases like slanting slashes; the anterior legs are whitish, tipped and spotted above with black, each ventral leg with a white crescentic mark above the foot; and there is some white on the anal flap.

After the third moult, in two or three days the length is 22 mm. and the thickness in proportion; the design, now more developed, shows the head yellow marked with black, and when protruded the horns colored orange-red, the ground color is of the palest greenish-yellow, though it is still white on the seventh and eighth segments, but showing only in transverse rings a little wider than the very narrow greenish-yellow ones round the others, for the middle of each segment is transversely banded with velvety black, but narrower on those two with white ground; the segmental divisions are grayish-black; the black velvety bands are intersected with three lines of the ground-color bearing the orange tubercles with black bristly apices except on the thoracic segments, where the black bands are broadest and only broken below, as on them the upper tubercles are completely surrounded with black; all the legs are white, marked with black.

After the fourth moult the length in two days is 31 mm., and in five more days is 46 mm. and very stout, its size and beauty of coloring being now at their greatest; the thoracic segments swell upwards in a rounded arch from the fourth, which is the largest, and viewed from above sharply taper thence to the head, which is the smallest, and bends downwards; the color of the head is bright yellow with a black oval spot on the face and two black streaks down either side, the ocelli in a black patch below, the mouth marked with black in the centre and on each side; papillæ whitish; on the front marginal ridge of the second segment occur two orange spots and two black spots in front of them close to the head, and between these pairs of spots is the concealed orifice from whence the retractile soft fleshy horns of pinkish-red color dart forth when irritated, and when seen at this period are uniformly stout, with blunt diverging extremities; the ground-color of the smooth skin of the body is a very brilliant pale yellow-green, becoming white on the belly and ventral feet, the segmental divisions widely banded with deep purplish edged with velvety-black, and across the middle of each segment is a broad velvety-black band covered with excessively fine bristly pubescence, and bearing the orange tubercle of the upper row near the front margin, and sometimes also that of the middle row; but generally this transverse black band is interrupted by an isthmus (so to speak) of the ground-color which bears this tubercle; and below there is always a slanting isthmus of ground-color bearing the lower tubercle; on the third and forth segments the broad bands have only this lower interruption, and bear the orange warts of the two upper rows (here diminished in size) in their middle; the anterior legs are white with black tips and joints; the ventral legs have each a narrow streak in front, a spot behind, and a large crescentic mark of black above the white feet, which have dark hooks; on the anal legs this black mark is purplish in the middle; the spiracles are blackish-slate color situate within the lower parts of the black bands; the whitish belly has a central series of blackish blotches, and narrow transverse bands in the deeply sunk divisions.

The pupa, when come to its full color, is pale yellow on the back and abdomen, and delicate light green on the head and wing-covers.

ENSWORTH, *February* 28, 1882.

WHAT CONSTITUTES A SPECIES IN THE GENUS ARCTIA?

BY R. H. STRETCH.

I have recently drawn some fifty figures of insects belonging to the genus Arctia as a portion of the illustrations to my synopsis of the North American Bombycidæ, and in the case of our Californian *A. achaia*, G. and R., have been compelled to give no less than twelve figures to illustrate even partially the variations to which it is subject. I confess myself utterly at a loss to frame a description of the species which shall enable the incipient student, with only one or two specimens before him, to recognize the insect without the aid of figures.

What may be considered a typical specimen has the primaries black, with the markings ranging from pale ochre to cream color. These markings, when all present, consist of a broad longitudinal band between the median and sub-median vein, two transverse bands, which may be called the sub-basal and median bands, and the terminal mark like the letter B with the upright stroke towards the base of the wing. The veins are also of the same color. On the secondaries, which are red inclining to orange, we have a marginal series of black spots, a sub-marginal series of four, one on the discal vein and two sub-basal spots, those on the costa and outer margin partially fused together so as to become what I designate below as sub-macular.

Now, on the primaries the veins are sometimes entirely black. Sometimes the basal band is absent and sometimes the upright stroke of the B, in which case the end of the wing reminds us of *A. virguncula*. On the secondaries the spots may be either small and distinctly macular, partially fused (= sub-macular) or entirely fused, leaving only an irregular discal patch of greatly reduced dimensions.

Finally, the secondaries may be yellow instead of red. The body parts alone appear of permanent color. I formerly described the yellow form as var. *ochracea*. The following table shows the distinct forms with which I am acquainted:

* Secondaries orange-red, macular;			
a Primaries with black veins;			
† both bands present	♂	♀	1
a a Primaries with pale veins;			
† both bands present	♂	♀	2
* * Secondaries orange-red, sub-macular;			
† both bands present	♂	—	3
† † basal band absent	♂	—	4
* * * Secondaries orange-red, suffused;			
† both bands present	♂	♀	5
† † basal band absent	♂	—	6
† † † upright of "B" absent	♂	—	7
* * * * Secondaries yellow, macular;			
† both bands present	—	♀	8
* * * * * Secondaries yellow, sub-macular;			
† both bands present	♂	—	9
* * * * * * Secondaries yellow, suffused;			
† basal band absent	♂	—	10

In form 7 the secondaries might be called either red or yellow, the color being doubtful. We are thus confronted with a case in which neither color nor markings can be relied upon to decide what constitutes *a* species, while at the same time the general appearance of the insect is very characteristic.

The same difficulty exists in the species, the different forms of which have been described as *A. docta*, *A. Mexicana*, *A. Autholea* and *A. Arizoniensis*, in which the secondaries of the female are red with black spots, and those of the male white, sometimes spotted and sometimes immaculate, while the primaries in some forms can only be described by locating the position of the spots, and in others the spots are so much increased in size that we are compelled to describe the pale markings. It takes five figures to illustrate this species.

In *Nemophila petrosa*, Walker, and its ally from Alaska, the secondaries range from nearly white to entire black, and some five figures are necessary to delineate the range of variation, while in the case of our Californian *Leptarctia lena*, Boisd., to figure every form it would be almost necessary to figure every example taken, as it is almost impossible to find two alike. In *A. Nevadensis*, Grote, and its variety *A. Behrii*, Stretch, the black head and thorax are very striking, but the markings on the wings are very variable, and so I might go on with many more of our Western forms.

The same difficulty exists among the forms from the Atlantic States, though whether to the same extent I do not know, not possessing equally full material for study. *Arge* I know to vary greatly, and I should be glad if Eastern students could furnish me with data relative to *A. virgo*, *Saundersii*, *Phyllira*, *figurata*, *celia*, *nais*, and *decorata*.

So far as I see, the vestiture of the body parts is of great importance, and it would be interesting to know whether, on close examination, these will furnish good specific characters. In all my series of *A. achaia*, however they may vary above, the males have a uniform pale ornamentation on the body beneath, and on the same parts the females are always black. In *Autholea* and its allies the tip of the abdomen is always black, etc.

In this connection, I would suggest to Eastern students, who are so situated that they can try the experiment, that much light may possibly be thrown on this intricate question by varying the food of the larvæ; as for instance, take a lot of young larvæ of *nais*, divide them into three lots, feeding one of them on the same food plant throughout, a second also on one plant, though of a different genus—or, what would be better, of a different order if possible—and the third on a variety of plants, changing the species frequently, or keeping a variety in the breeding cage all the time. It would be of great value to note the results, whether one or several forms were produced, as bearing on the question of what constitutes a species in this group. If possible it would be well to know the parent form from which the larvæ were raised.

If those who possess peculiar forms of any of the Eastern *Arctians* would send me pen and ink sketches of the markings, it would greatly facilitate my labors, and due credit shall be given; and at the same time I would ask those who possess good fresh specimens to put on record the results of their examinations into the stability of the coloration of the body parts, as a guide to the separation of the species of this and the allied genera, which vary so infinitely.

NEW FORMS OF NORTH AMERICAN COSSIDÆ.

By JAMES S. BAILEY, A.M., M.D.

COSSUS ANGREZI. n. s.

♀. Head somewhat narrow on the vertex. Collar and head yellowish gray, thorax black; the edges of the tegulæ shaded with yellowish gray. Fore wings with a nearly white ground, shaded with black, and with black reticulations. Hind wings yellowish gray, mottled with blackish outwardly. The fore wings have the costal edge pale, marked with black; the black shading obtains on costa at apical third, and over the whole wing at terminal third, extending obliquely downwards and inwards; there are a series of interspacial longitudinal black streaks before the margin, more or less defined. Fringes whitish, dotted with black opposite the ends of the veins, which latter conversely are whitish. Thorax shaded with yellowish gray behind. Abdomen dark gray. Beneath, the wings repeat the markings very distinctly, owing to the strong contrast of the pale ground color with the black markings. Expanse, 82 mm. 1 ♀. Wells, Elko Co., Nevada. From the late Mrs. Caroline Chase. Type, coll. James S. Bailey.

COSSULA. n.g.

Size small. Antennæ of the female bipectinate to the tips, the inner series one-third of the length of outer pectinations. Eyes naked. Clypeus relatively broad. Labial palpi well developed, squamous, third article small; the palpi extend as far as the front. Tongue wanting. Hind tibiæ pilose. Fore wings rounded at apices. Wings broad.

The neuration of *Cossula* is peculiar. The fore wings of *Cossula* are 12 veined. Vein 5 belongs to the series of median nervules, and sets back along the middle of the discal cell, dividing it into two fields, to the base of the wing. Vein 6 is rather weak; 8 out of 7; veins 9 to 11 are simple, thrown off at elbows or angulations of the subcostal vein. The type of neuration of *Cossula*, as well as other *Cossidæ* examined, does not suggest an affinity with *Castnia*, as, I believe, Mr. Butler views the affiliations of the group. We must rather expect to find that the *Tortrices* and *Cossidæ* have been, in times past, nearer allied than at present. The *Cossidæ* are a low form of *Bombycidæ*, and the discovery of small forms like the present materially alter our ideas of the group based on the large of Europe.

Natural History.

We are indebted to the intelligent and indefatigable labor of Mr. Albert Koebele for the discovery of this interesting insect, which he found in the vicinity of Tallahassee, Florida, during May, from the 9th to the 16th, 1880. The larvæ were found boring species of oak and hickory. The presence of the larvæ were detected by the gnawings of the wood being distributed around the roots of the trees. Mr. Koebele mentions the fact of having seen a single live oak (Quercus virens) standing in an open field which contained many larvæ, and their debris, resembling sawdust, was distributed over the ground around the roots of the tree more than six inches in depth. At the period of pupation the larvæ, as is customary with the *Cossidæ*, takes its position near the surface of the bark. The tunneling is usually conducted near the surface, from one-quarter to one inch beneath the bark. After imaginese emerge their pupa-cases are left protruding through the bark. Specimens of the larvæ and eggs were not preserved for description.

Pupa-case. The long testaceous pupa-case is provided with an irregular series of five tuberculations on each side of the anus; the segments have a narrow mesial corinei near the spiracles.

COSSULA MAGNIFICA. n. s.

♀. Fore wings fuscous gray, smooth, with indistinct fragmentary black reticulations. A light brown patch covers the terminal field of the wing, containing dark brown speckles on the inner edge. Before the patch a light gray subterminal shade. A pale shade about the discal mark. Fringes brown, interlined. Hind wings blackish fuscous; fringes faintly interlined. Front yellowish. Antennæ testaceous, stem with white scales. Collar dark. Thorax light gray, abdomen dark gray. Beneath irregular dotted; costa of fore wings with dark dots; terminal brown patch not defined. Expanse, 36 mm. Habitat, Southern Florida. From A. Koebele. Type, coll. James S. Bailey.

THE NORTH AMERICAN SPECIES OF NONAGRIA.

BY A. R. GROTE.

But few species of this genus, which is allied to *Heliophila* (*Leucania*), are found in collections. After having seen the types of the supposed species described by Mr. Walker, I can discard them as not belonging here (c. f. my notes in "Illustrated Essay" on the *Noctuidæ*). The extent to which the species vary is not known. Guenee describes:

Nonagria Inquinata, Noct. I., 104. "21 mil. Habit of *Fulva*. Fore wings of a dirty ochrey white, the nervules a little paler, and with blackish atoms strewn here and there on the disk, and chiefly below median vein. A black streak interrupted and situate beneath the sub-median vein and filling the space which usually divides the two median lines, the elbowed (t. p.) line partly marked in black. A series of terminal elongated dots. Hind wings dirty white. Beneath, the four wings of a yellowish white without markings. A female specimen from New York in Mr. Doubleday's collection."

The type of this ought to be in the British Museum collection, but I have not seen it. I believe that Guneeé's types collected by Doubleday will all be found there.

Nonagria Enervata Noct. I. 105. "30 mil. Habit of *Neurica*, but more oblong. Fore wings entirely of a shining, blackish gray-brown; without spots or any distinctive shade on the veins. Only at the extremity of the cell are two superposed blackish points, hardly noticeable, and some terminal dots. Hind wings dark ashen, concolorous. Beneath, the four wings of the same concolorous shade. A single male from Florida; collection of Mr. Doubleday."

NONAGRIA FODIENS. id. loc.

"Habit of *Neurica*, but more oblong. Fore wings with nearly parallel margins of a gray-brown; the median vein and base of sub-median largely powdered with blackish. Traces of the extra-basal (t. a.) line. A double series of dots continued to the margins in the place of the elbowed (t. p.) line (the first series being the line itself, which is interrupted and hardly marked). A black spot divided in two in the place of the reniform. Tips of the nervules forming darker rays and an inter-nervular series of terminal points. Hind wings dirty white, with a vague line and lunule beneath in the female. Florida collection of Mr. Doubleday. A single specimen (♀). Abdomen terminated by a corneous piece, divided in two flattened blades, twisted beneath and bearing hairy or silky tufts."

NONAGRIA LAETA. Morr., Bost. Proc., Oct., 1875.

"Exp., 37 mil. Length of body, 23 mil. Eyes naked. Front with a sharp, horny protection covered with hair. Abdomen extremely long, with a pointed anal tuft, which conceals the long, curved ovipositor of the female. All the head and body parts concolorous with the wings. Anterior wings brown, with a few longitudinal yellowish scales; all the veins dark, purple brown, contrasting; a blackish, diffuse discal spot; fringe concolorous, having a darker shading at the base. Posterior wings gray-brown, lighter and yellowish at base; fringe yellow. Beneath, brownish yellow; central portion of the anterior wings blackish; discal dots present. New Jersey. From the collection of Mr. Herman Sachs."

Mr. Morrison compares this with *Enervata;* it is like *Fodiens* in the structure of the ovipositor. I have not seen the type. I have bred examples of the European *Typhæ* and *Geminipuncta*, Hatchett, for comparison.

NONAGRIA SUBFLAVA. n. s.

♀. Eyes naked. Clypeus horned. Dusky yellow or buff. Median vein smeared with black. A single row of distinct black dots on the veins in the place of the t. p. line, obsolete on costa. Stigmata vaguely indicated by paler shades. Nervules paler than the wing, terminally accompanied by blackish shadings. Fringe concolorous. Hind wings, yellowish whitish; no marks. Beneath without marks, yellowish white. Head and thorax dusky buff; abdomen paler. Northern Illinois. Smaller than *Typhæ.*

The following is probably the male of *Laeta:*

♂. Forewings rich, reddish brown, the veins nearly black; they might be called purplish black or brown. The interspaces have a paler, somewhat yellowish tint. No lines and no discal spots. Hind wings reddish brown, a little paler than primaries and paler at base. Body duller and lighter brown. Eyes naked; front mucronate. Beneath without marks, paler; disk of primaries a little blackish.

That there are no discal marks makes me doubtful. No. 1, Kittery Pt., Me. Coll. R. Thaxter.

The following is probably a modification of *Subflava:*

♀. Paler, dusty yellowish or ochrey, terminal space continuously fuscous and contrasting. Smaller than the type. Hind wings pale, with a very faint indication of an extra-mesial line. T. p. line a single row of black dots. Stigmata indicated by paler shades on the disk; all three indicated. No. 2, Kittery Pt. Mr. Thaxter's collection. The following may be an unnamed species; the specimen is a little rubbed:

♂. Fore wings reddish brown, the veins indistinctly paler. The t. p. line indicated. The discal stigmata indicated by brighter colored shades. Hind wings pale yellowish, contrasting. Head and thorax sable brown. Abdomen lighter. Beneath pale, with a vague blackish extra-mesial band. The veins tend to be outlined in black on fore wings alone. No. 3, Kittery Pt. Collection of Mr. Thaxter.

NONAGRIA OBLONGA. n. s.

♂. Pale reddish or yellowish gray, something the color of *Mythimna Pseudargyria,* Guen. Primaries somewhat oblong, internal angle rounded away; apices softened, costa a little arched. Eyes naked. Clypeus mucronate. Palpi prominent, concolorous. Markings obsolete. The fine, dark, linear denticulate t. p. line barely discernible. Stigmata very vaguely indicated by paler shades. Hind wings with a faint mesial black shade band; centrally stained with blackish; fringe and external edge like abdomen and very little paler than the rest of the insect. Beneath pale, with the disk of fore wings blackish; a common blackish extra-mesial shaded line. Minute black discal points. Smaller than *Typhæ.* No. 5, Kittery Pt. Coll. R. Thaxter.

FURTHER NOTES AND DESCRIPTIONS OF NORTH AMERICAN ÆGERIADÆ.

BY HENRY EDWARDS.

TROCHILIUM GALLIVORUM. Westwood.

My friend, Mr. W. F. Kirby, of the British Museum, writes me with reference to this species: "Westwood's *Troch. gallivo-*

rum has been overlooked by all authors. It was bred from galls of *Quercus patustris*, received from U. States, and was described in Proc. Entom. Soc. (2) III., p. 21, 1854, and in the Gardener's Chronicle for 1854, p. 757, with woodcuts. I know that some gall-feeding species have since been described by American authors, and I have compared the descriptions without being able to satisfy myself as to their identity. Westwood's description is as follows:

"'Exp. al. 8 lin., Long. corp. 5 l. Blue black, with two slender, pale yellow, diverging lines on the sides of the thorax above, and with the edges of the tail also pale yellow; wings transparent except the dark fore margin, a curved bar across the middle, and a pale brown apical border; legs yellow, with a dark ring around the tibiæ near the tips.'"

SOSPITA QUINQUECAUDATA. Ridings.

Mr. Kirby also informs me that the above generic name, which I proposed for the species, is preoccupied. I therefore change it to PHEMONOE.

TROCHILIUM DENUDATUM. Harris.

The ♂ of this species, which appears to have been unknown to Harris, is an insect which doubtless exists in many collections, but from its entire want of resemblance to the well-known ♀, passes probably under other names. Its color is dull brown; the abdomen has no trace of bands in the examples before me, though in very fresh specimens there may be narrow yellow margins to the segments. The antennæ are long, chestnut brown in color, very deeply and densely pectinated, more so than in any other species known to me, the pectinations ceasing about 2 mm. from the tip, where the joints are soldered into a serrated point, surmounted by four fine *ciliæ*. The palpi are pale yellow. Legs chestnut brown. The forewings have the margins rather broadly opaque, chestnut brown; across the cell, and including the discal spot, is an oblique, sub-opaque band, broadest on costa. The nervules and fringes are chestnut brown.

Exp. wings, 36 mm. Length of body, 20 mm.

The sexes were found in coitu by Mr. H. Strecker, who kindly furnished me with his notes thereon, so that there can be no mistake in my present determination. I am inclined to think that this is the species described by Boisduval as *Sesia asilipennis* Lep. Heteroc., p. 391.

FATUA. n. genus.

The extreme difference between the sexes of the above species seem to point to a new genus, for which I have selected the name of FATUA. It may be thus characterized:

Male.—Fore wings long, very much narrowed towards the base, not covered with scales. Hind wings very large, ample, rounded on anal margin. Legs long and slender. Antennæ with very deep pectinations, ceasing before the tip, which is a solid mass, and bears some fine bristles. Palpi long, terminal joint extremely so, with the basal hairs very dense. *Female.*—Less robust. Fore wings opaque, except a space near the internal angle. Antennæ roughened, but not serrated, much thickened towards the tips; abdomen very long, pointed at the tip, ovipositor protruding, compressed on its lower side into a small groove.

ÆGERIA PRÆSTANS. n. sp.

Head black, with orange tuft on crown; palpi bright orange. Eyes brown; a bluish metallic reflection in front. Thorax bronze black, with orange stripe at the sides. Beneath, the thorax has a pale orange patch below the base of the wings. Fore coxæ bronze black, with orange scales. Femora bronze black, tibiæ deep orange, the posterior pairs brightest in color. Tarsi buff yellow. Abdomen bronze-black above, with faint traces of coppery-red bands at the posterior edge of sixth segment. Beneath, the sides and edges of four posterior segments coppery-red. Caudal tuft also coppery-red, with the sides bronze. Fore wings above, have the margins and discal mark, bright bronze. The transparent space before the cell broadly edged with fiery red. Behind the discal mark, the space is broadly streaked with the same color. Internal margin a patch at base of primaries, and the costal margin of hind wings also fiery red. Beneath, the markings are repeated, but the red shade in more truly orange, and is diffused over the whole of the opaque portions of the wing.

Exp. wings, 23 mm. Length of body, 10 mm.

1 ♂. Washington Ter. (H. K. Morrison).

Type. Coll. B. Neumoegen.

ÆGERIA QUERCI. n. sp.

Allied to *Æg. nicotiana*, Hy. Edw., but much more delicate in aspect, and with the markings paler. Head and thorax bluish-black, the former with bluish scales between the eyes. Antennæ brown black above, yellowish beneath. Palpi blackish-brown, with the basal joints much enlarged. In *Æg. nicotiana*, these organs are golden yellow beneath, and do not present the swollen appearance of the present species. Thorax with narrow lemon-yellow line at sides. Collar and base also narrowly lemon yellow. Abdomen with the posterior edges of 3d, 5th, 6th and 7th segments narrowly, and of the 4th broadly edged with lemon yellow, the band of the last-named segment extending broadly beneath. Caudal tuft rather broad, wedge-shaped, blackish, with yellow hairs intermixed, and with the sides lemon yellow. Pectus lemon yellow. Legs bluish-black, the tarsi and joints of femora and tibiæ whitish. Wings beneath, with costal margin and discal spot, lemon yellow.

Exp. wings, 8 mm. Length of body, 4 mm.

From galls of "Live oak," Arizona.

Type. Coll. Hy. Edwards.

Ægeria Prosopis. n. sp.

Jet black. Palpi beneath, pectus, fore coxæ, and joints of tibiæ and tarsi, clear white. Abdomen very glossy beneath, but without any trace of a band. Caudal tuft jet black. Antennæ black, unusually thickened through their entire length. The margins of the wings are black, with slight metallic reflection. Transparent space behind cell of forewings, with silvery white streaks, and a silver streak along internal margin. Fringe of fore wings brownish black, of hind pair dull white. Beneath, the wings are white, except the apical margin and large discal spot, which are jet black.

Exp. wings, 15 mm. Length of body, 8 mm. Arizona. 1 ♂. Coll. Hy. Edwards.

This singular species was raised from a gall on the Mesquit. (*Prosopis juliflora*, D. C.) *Gall.* Sub-ovate in form, dull brown in color, surface very much roughened, placed in the axils of the branches.

Length, 30 mm. Breadth, 18 mm.

LARVÆ OF NORTH AMERICAN MOTHS.

By A. R. Grote.

Notodonta Stragula.

Larva on willow, smooth, grayish violet, shading to reddish on the dorsum of two last segments; first five abdominal segments with an oblique pale lateral stripe, that on sixth segment reddish; first two segments with a sharp fleshy protuberance on the dorsal line. Dorsal stripe brownish, darker on thorax and on the upper edge of the two elevations. Head and feet brown; anal segment enlarged, terminating regularly and obliquely backwards to the anal claspers. This is probably its final moult.

Eulonche Oblinata.

Blackish brown, with tufts of short yellowish hair. A broad yellow band, formed of irregular spots on the segments below the stigmatal line; above this a lateral series of Γ-shaped marks. Segments dorsally elevated. Head dark. Larva on willow.

Mamestra Picta.

Head and feet orange. Velvety black, reticulated with bluish white. Two yellow stripes, subdorsal and stigmatal. Larva on Golden Rod.

Phlegothontius Celeus.

The brown variety has the head striped with yellow. The stigmata enclosed by the fork of a yellow Y-shaped stripe, the lower line continuous; the thoracic segments frosted with whitish speckles. Larva on tomato.

NOTES ON CERTAIN GEOMETRIDÆ, WITH A NEW BYSSODES FROM FLORIDA.

By A. R. GROTE.

I offer the following notes on species from the East, described originally before the publication of Dr. Packard's Monograph. The discovery of a member of the tropical genus *Byssodes* of Guenée in Florida is interesting and, I believe, new.

SELENIA KENTARIA, *G. & R.*, Trans. Am. Ent. Soc. I., Pl. I., fig. 5–6.

The female of this fine species was discovered by Mr. C. T. Robinson at his country place in Kent County. I am not sure where this typical specimen now is; it is, perhaps, in the Central Park collection. Dr. Packard figures a male specimen, pl. 12, fig. 26. Whether there is a third species of *Selenia*, as might be suspected by Dr. Packard's two descriptions, I have no material to decide. Walker's *Alciphearia* is quite distinct, by its straight lines, from *Kentaria*. Probably to the ♂ figured by him, and which I have never seen, Dr. Packard has given the MS. name *Violasceus*, as would appear from page 525 of his Monograph; he evidently intends our species from his remarks. I have not seen the type since description. As Dr. Packard does not acknowledge it, I judge it did not go to him with the rest of the material sent him for his Monograph, being probably collected later. Our figure is colored in most copies, and represents the female type, which was fresh from chrysalis, in two positions. I do not think there can be any doubt as to the species, which appears early in the year, and is hitherto rare in collections.

ENDROPIA TEXTRINARIA, *G. & R.*, Ann. N. Y. Lyc. N. H., Pl. 15 A, fig. 6. ♂.

Our type went to Dr. Packard. This species is "tailed," and cannot be confounded with any other from its ornamentation and shape of wing. Our figure is colored. Dr. Packard figures the larva and pupa from a drawing by Abbott, who gives the food plant as *Uvularia perfoliata*.

ENDROPIA HOMURARIA, *G. & R.*

The type may be in Central Park collection or in Philadelphia. It is important, perhaps, because Dr. Packard refers the moth to *Duaria*, which seems quite wrong. He does not quote our type. Prof. Lintner showed me a specimen of *Homuraria* collected by Mr. W. H. Edwards in West Virginia. It is allied to *Hypochraria*, somewhat heavier, and more intensely colored, intensely ferruginous and brightly colored beneath. The wings are shaped as in *Hypochraria*, not as in *Duaria*, as I recollect the type. The fore wings have the costa straighter, and appear narrower than in either of its allies. I was quite convinced that the moth was neither *Hypochraria* or *Duaria*, but have had no series to examine. The angulations are even sharper than in *Hypochraria;* while in *Duaria* they are softened.

ENDROPIA VINULENTARIA, *G. & R.*, Ann. N. Y. Lyc. Hist., Pl. 15 A, fig. 5. ♀.

The type of this was not returned by Dr. Packard, as far as I am aware. It is figured by him on Plate 12, fig. 14 of his Monograph. It cannot be confounded with its ally *E. vinosaria* on account of the simple extra discal line, the dove color or " chocolate-brown" of the wings within the outer median line, and the unbroken purplish terminal field of hind wings. The original figure is colored. There is no doubt of this very pretty species, which is in most collections.

BYSSODES CERUSSARIA, n. s.

Mouse-gray; concolorous. At base of fore wings an ochre line edged without by black and gilded scales. A sub-basal band angulate on sub-costal vein, ochre, edged with black and gilded scales. A similar band at middle of wing, first narrowly black and gilded inwardly, then ochre, then narrowly white. Outwardly the mesial band shows a gilded edge at costa. Hind wings with a continuation of the mesial band, an ochre stripe edged on both sides finely with black and gilded scales; beyond again ochrey. A subterminal bluish metallic narrow band. On interspace between veins 3 and 4 a small red spot edged with silvery and then black scales without; a larger spot on the interspace above. Beneath paler, without marks; a shaded mesial band indicated. Coll. Hy. Edwards and B. Neumoegen, Esqs., Indian River. Allied to Drury's *Geometra Argentata* from Jamaica.

This species differs from any described by Guenée in this tropical and beautiful genus. With *Cautethia Grotei*, *Scepsis Edwardsii*, *Litoprosopus Futilis* and several butterflies, it shows the relationship of the South Floridian fauna with that of Cuba and the West Indies. Is it not possible that there has been a former connection between the Peninsula and the Islands?

NOTES ON LEPIDOPTERA.

ALYPIA DIPSACI, *G. & R.*—As this species has not occurred, so far as I know, to any collector since Mr. Lorquin supplied the types to Boisduval many years ago, it may be of interest to record the receipt from Dr. Behr of one very perfect male taken recently at Salinas, in Monterey county, California, which corresponds identically with the description of G. & R.—R. H. STRETCH.

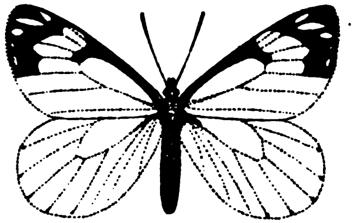
XYLINA CINEREA.—In his note on this species (p. 63), Prof. Fernald has apparently misapprehended the spirit and object of my remarks (p. 43), which were designed to refute the charge that the species was known to science at the time of the description rather than to question its identity with *antennata*. The fact that subsequent comparison with Walker's *antennata* showed *cinerea* to be that species (a decision which could not have been reached from the description of *antennata* which Mr. Grote admits " is far from satisfactory") does not affect the case. Yet I referred to the possible doubt implied in the Brooklyn list because I think it is justified. *Cinerea*, as I know by rearing it from the larva is an exceedingly variable species, as some allied European moths are well-known to be. My description included what Grote subsequently described as *laticinerea* and *cinerosa*. Now, if the three forms are worthy of being ranked as species (which I by no means admit), why should any one of them more than another have been chosen as typical of *cinerea?* In answering the question it will be found that opinion has played its part in the matter as against fact, and that the question as to which is *antennata* is quite legitimate! My original description, as stated, included them all, and in fact the *cinerosa* form heads my series. But this name was already preoccupied by Guenée in the same genus, and I would propose the name *Grotei* in its stead, and would thus label the species:

XYLINA ANTENNATA, Walker.
var. *Grotei*, Riley.
var. *laticinerea*, Grote.

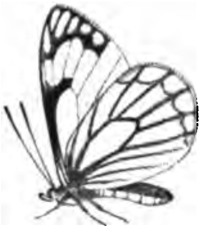
—C. V. RILEY.

EGG OF HEMILEUCA YAVAPAI, *Neum.*—Laid in belt-like masses, fastened by a gummy secretion, smooth, rounded, the shape varying according to position in the mass, the inner eggs more elevated and rounded, the outer more elongate, the top flattened, hardly depressed, the surface mottled with a darker green; general color light green.—A. R GROTE.

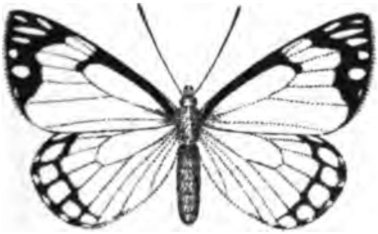
Papilio. Vol.II. Pl.II.



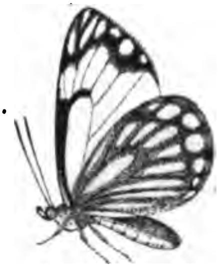
1. ♂



2. ♂



3. ♀



4. ♀

PIERIS MENAPIA Feld.

Var. Suffusa.

Britton & Rey. S.F. photo-lith. R.H. Stretch. del.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] September, 1882. [No. 7.

NOTES ON PIERIS MENAPIA.—FELDER.

By R. H. Stretch.

While in company with Professor Hagen and Mr. Samuel Henshaw, of the North Transcontinental Survey, during the present summer, it was my fortune to find this delicate butterfly in excessive profusion, and as it must now take rank among our injurious insects, it is thought that the following notes may be worthy of publication.

Distribution.—The species was first seen by our party at Spokane Falls, in Washington Territory, near the Idaho line, on July 22d, the altitude above the sea being about 1900 feet. The few specimens captured were all males and much worn. A number of others were seen, but their peculiar habit of flitting around the tops of the larger trees prevented capture. On July 23d, I found the larvæ and pupæ in great numbers on the trunk of a yellow pine, at a point on the Colville road, about ten miles north of the crossing of the Little Spokane River, and about ten miles south of Loon Lake, but did not notice the insect on the wing. At Loon Lake a few worn specimens were seen (all males), and I again found the larvæ and pupæ on the trunks of pine trees in immense numbers, say not less than from 200 to 300 within six feet of the ground. Between Loon Lake and Brown's, the latter place being fifty-four miles from Spokane Falls, the same phenomena were again noticed, but with the difference that the imago was emerging in great numbers. I took probably seventy specimens, both ♂ and ♀, in a few minutes, and over one hundred and fifty in the course of the day. It would easily have been possible to make the number 1500. Most of those taken were picked off the trunks of the trees, just fresh from the pupa, having never been on the wing. At Brown's both larvæ, pupæ and imago were equally common, though not many of the latter were on the wing until towards evening, as the day was cloudy. Towards evening the sun shone out for a few minutes, and instantly the air was alive with butterflies, flitting round the pines in countless numbers, and glistening against the dark green of the young timber, like the most delicate snow-flakes. Some idea of the immense numbers of the insect may be gathered from the fact that in the infected district near Brown's, on every little pine, though not more than two feet high, on each terminal bunch of needles, from one to twelve larvæ or pupæ could be counted, and every weed could show its quota of pupæ. Our trip did not extend northward beyond this point, but the appearance of the forest showed that we had not reached the limit of the plague. On July 25th we returned to Loon Lake, finding the insect in all stages, from full grown larva to imago, excessively abundant, with eggs, larvæ and pupæ on both the fir (*Abies balsamii*) and tamarack (*Pinus contorta*) as well as on the pines. Returning south, the insect was common for eight miles; in the next three it grew gradually rarer, and then we lost it altogether, though this may be partly the result of the greater rarity of yellow pine timber (*Pinus ponderosa*) and the predominance of fir and tamarack along the line of travel. On July 27th we saw a few sporadic butterflies as we approached Spokane Falls, say five miles from town. Round the latter place it did not seem to be abundant, but occurred on the 28th in greater numbers, as we approached Cheney by rail, and was seen about ten miles west of that place, or about twenty-five miles southwest of Spokane Falls, near the edge of the timber.

What the extension of this affected area may be it is impossible to say, as there are no accessible data at hand; but as the insect is found in California, in Plumas county about Lake Tahoe and elsewhere, more than 630 miles to the southward, and also in Colorado and Vancouver's Island, it is evidently of very wide distribution, latitude in the north taking the place of altitude in the south; and consequently the same phenomena which we are here called to note may occur in localities where the timber is both denser and more valuable than in that under consideration. Whether it occurs in the coast range in Washington Territory I do not yet know, although we might expect its presence, as the Cascades offer a similar vegetation, as well as from the general similarity of the Rhopalocerous fauna on both sides of the great Columbia plateau, as evidenced by the occurrence of the same species of *Pieris, Colias, Argynnis, Satyrus and Papilio.* The area actually visited where serious damage has been already committed extends about 25 miles north and south, with an unknown width, and in this region *all* the yellow pines have been nearly or totally stripped of their foliage, as well as many of the smaller species of *Coniferæ.*

The appearance of the Forest is peculiar. The first impression was that fire had scorched the tops of the trees, so brown and withered did they look in their clothing of dark, blackish moss;

and before the cause of this effect was discovered, it was only by persistently remembering that all the large fir trees were green that the idea could be kept out of the mind.

Life History.—Unfortunately we were only able to study the insect for about seven days, or from July 22d to 28th, inclusive. During this period we witnessed the pupation of the first brood, the emergence of the imago from this brood and the deposition of the eggs. Whether these eggs will hatch this season or remain as eggs until next spring we do not know. If they do hatch, as is probable, the larvæ will be innumerable and produce widespread devastation. Neither do we know at what period the butterflies appeared in the spring, or whether they appeared at all. From analogy there ought to have been a spring brood, of which we found the descendants; but if so, they do not appear to have specially attracted the notice of the scattered settlers, although they observed great numbers last year during the summer. It is therefore evident that, so far as observations in this part of the country are concerned, there is yet much to be learned. All parties, however, who were questioned on the subject agree that the season of 1881 was the first in which the abundance of the pests was such as to cause general comment, the opinion being often expressed that it was not previously known, although this is evidently erroneous. As the winter of 1880–81 was exceptionally severe and peculiar in some of its meteorological phenomena, it becomes of importance to solve the query whether the sudden increase of this species was due to peculiar climatic conditions which destroyed great numbers of its parasitic or other enemies without impairing its own vitality. Certain it is that the silence of the forest was most remarkable, the absence of birds being specially noticeable, while bats were more than rare throughout the whole region traversed by our party, on both sides of the great plateau.

Habits of the Imago.—The perfect butterfly, when just out of the chrysalis, is one of the most beautiful, but, at the same time, most delicate of its race. It is fragile in the extreme, and soon loses its freshness from its habit of creeping into and between the pine needles in search of the female, or for the purpose of laying its eggs. Great numbers must perish accidentally in high winds; indeed, dead or damaged ones were plentiful in the dust of the roads. Copulation takes place almost directly after emergence, often before the wings are fairly dried; sometimes the ♂ being as fresh as the ♀, sometimes old and worn. The average duration of life is probably very short, and in this connection it would be interesting to ascertain whether the worn males first seen were relics of the first brood or exceptionally early stragglers of the second.

The Egg.—Examination of the abdomen of a female just after copulation disclosed 49 well-formed eggs. Search for eggs on the terminal needles disclosed them in groups ranging from 3 to 22 in number, deposited in a row on the needles, the eggs not being set upright, but at an angle of about forty-five degrees, overlapping each other like shingles, and apparently thoroughly cemented together. Those found were on young trees which had not been touched by the first brood of caterpillars. A female found in copulâ in the morning was imprisoned about two o'clock on a pine fascicle, and by six o'clock had laid 16 eggs in a continuous row. These were pale green, ovate, with a small white coronet or raised circular ridge at the top, and somewhat flattened on the sides that touched each other.

The Larva.—The earlier stages did not pass under review, but there is no reason to suppose that they differ materially from those about to pupate, which alone came under our observation. Just as the eggs were not laid on the extreme terminal needles, so the larva does not commence feeding on the youngest, and, supposedly, the most succulent needles, but on those which form the base of each terminal fascicle, continuing its devastation towards the tip; but even in cases where all the needles have been denuded, in no case was the terminal bud touched; indeed, the needles are only devoured down to the dry sheath which encases their base. On many trees *all* the needles were gone; on many others there yet remained a few of the terminal ones, and such trees, as Dr. Hagen suggested, conveyed the idea of immense candelabra. It is evident that many of the larvæ pupate on the few remaining needles, where such exist, invariably with the head uppermost; but many forsake the parent tree, and these are probably such as have consumed all the food in their immediate vicinity. While many larvæ were found ascending the trunks of the larger trees, but very few were found descending them, while a large number were seen hanging at the end of long silken threads, swaying to and fro in the wind. Experiments on these by Mr. Henshaw and myself fully proved the fact that the larva lets itself down from high trees by means of this thread to the ground, abnormal as the habit is among the butterflies. In one case, where the thread was fully 50 feet in length, I passed my hand beneath the larva, to satisfy myself that it was not descending a spider thread already woven (of which I had a suspicion on account of the great number of threads over the bark of the larger trees), and found no connection with the ground; I then caught the thread above and the larva descended gently, while swaying in the wind, but detached itself directly it touched the first object. Mr. Henshaw obtained the same results. Among the larvæ which thus reach the ground it is evident that many attempt to regain the upper limbs, for I found several trees which had been girdled by stripping off the bark over a length of some four feet, and on such trees several hundred larvæ had been caught on the sticky, resinous surface thus exposed. Perhaps the most extraordinary circumstance connected with the change to the pupa was the occurrence of many pupæ suspended on their threads, in which case the larval skin is shrivelled up round the last segment of the pupa.

While the favorite food plant appears to be the yellow pine (*Pinus ponderosa*), both *Pinus contorta* and *Abies balsamii* were slightly affected, the latter much the least, and it is not unlikely that these two trees will form the staple food of the next brood in the districts where the yellow pines have been denuded, should it hatch during the present season, as is probable.

Enemies.—The absence of birds has already been noted May it not be that the larva is distasteful to them? As is well known, it generally happens in the case of native insects that while they may gain a temporary ascendency they are ultimately checked by an overwhelming army of parasites, which relegate them to their normal position in nature. We might thus expect such a thing to occur in this case. Whether this natural check may come into play this year or be delayed for several years, we are not in a position to say. The search for parasitic insects was not productive of either species or numbers. *Ichneumcnidœ* were particularly scarce on the wing, both round the trees and on adjacent flowers. Indeed, the only conspicuous enemy was a large heteropterous insect allied to *Pentatoma*, which was not uncommon, and certainly lived on the larvæ, having been taken by myself in the act of sucking out the nearly empty flaccid skin. Many such skins were found upon the needles and on the ground around the base of infected trees. The numbers of this insect, however, were, apparently, not sufficient to produce any appreciable result.

Whatever hope is based on relief from parasitic insects, so far as we know at present, must rest on the large number of parasitical pupæ, although even here the percentage does not appear to be very large, although they are numerically numerous; at least, I judge so, from the following observations. The normal color of the pupa is pale green. All those pupating on the needles of the young pines or shrubby plants in the underbrush were of this color, a close search failing to reveal an exception, while the larger proportion of those on the bark of the large trees were blackish brown. An examination of a number of these makes it probable that they are all diseased, not a few containing a larva, either dipterous or hymenopterous; certainly the latter, in one case at least (one pupa contained a large ichneumon nearly ready to emerge, which was accidentally killed). It is somewhat strange that all these dark pupæ should occur on the bark of large trees. May it not be that their diseased condition had prevented the secretion of silk, and that, being thus prevented from dropping to the ground in the usual way, they had wandered part of the way down the tree before the final change, their restlessness being due to the same cause?

Probable Damage to the Forest.—While the affected trees, at a casual glance, look dead, and are evidently considered by the settler to be killed, it is still an open question whether they are really so. It is true the foliage is gone and the tree must have an impaired vitality, but as long as the terminal bud remains untouched the tree would partially recover itself in the ensuing spring, unless again stripped of its scanty covering. In this case it is probable death would ensue. What remedial measures can be adopted it is too soon to say. Observations should be carried on for the balance of the season, and I have suggested the propriety of this course to Professor Pumpelly, who is at the head of the North Transcontinental Survey.

That such an increase of this butterfly is extremely rare, or that if it does occur frequently it is not fatal to the trees, is proved by the otherwise healthy condition of the timber. The number of trees which may be put down as absolutely dead, but yet standing, is very small, and the fallen trees are practically absent, even in the worst districts. I am, therefore, in hopes that the plague is only temporary and the damage more imaginary than actual.

(Unfortunately my pupæ were killed in transit, by the breakage of a bottle of chloroform, so that I have failed to raise their parasitic contents.)

Technical Notes.—Mr. Henry Edwards has given a good description of the pupa in the Proc. of the California Academy of Sciences, but was not acquainted with the larva. I therefore add a description of the mature form. I have not Mr. W. H. Edwards' figure of the male for reference, but know that it must be good.

Mr. Strecker's figure of the female reminds me of specimens I have seen from California, though it is roughly drawn; but it does not resemble a single female among those taken on this trip. Indeed, when I first took the female I made the suggestion that we had found a new species, as there was no trace of red on the secondaries beneath, and the predominant color was black. Not having types before me for comparison, I am unable to determine whether or not the insect now under consideration is worthy of a special name, and I therefore add a full description of both sexes for future reference.

Description of Imago.—Head and body black above, with white hairs, the latter white beneath. Palpi yellowish, with fringe of black hairs; antennæ black.

♂.—Primaries pure white, with jet black markings as follows: Fringes white, a black costal streak, narrowest at the base, extending to the discal vein, at which point it is suddenly bent inwards and extends over the discal vein to the median nervules. A black apical patch deeply three-notched inwardly, and cut square off on the second median-nervule, containing five white spots; the costal one small, the second long and ovate, the third and fifth about the size of that on the costa, the fourth minute.

Secondaries pure white, with a few black scales at the base of the median vein ; and sometimes in specimens which are very dark beneath, there are visible portions of the submarginal band, as seen beneath.

Beneath, the primaries show the same general markings, but the white spots in the apical black patch are much larger, with more diffuse margins, and are increased to six in number by the addition of one between the first and second at the extreme tip of the wing.

Secondaries pure white ; all the veins black, with a narrow submarginal band, most remote from the margin about the middle of the outer edge. Occasionally the veins are intensely black, with the scales spreading more or less over the disc of the wing, in which case there are many powdery black scales, most concentrated along the outer and inner margins, the former in this case having a narrow terminal black line. Fringes white.

In occasional specimens there are traces along the costa and on the outer margin between the nervules, of the red markings so characteristic of the female.

♀.—The primaries differ from the ♂ by the extension of the black apical patch to the inner angle, it gradually narrowing thereto from the second median nervule, and containing a small white spot between the first and second median nervules. The same ornamentation is repeated beneath.

The secondaries above are white, with a marginal and sub-marginal narrow black band. The nervules, black between these bands, dividing the enclosed space into six unequal lunules, as in the male beneath. The outer band sometimes faintly interrupted between the veins with a few orange or brick-red scales.

Beneath, all the veins are broadly black, as are both the outer bands, reducing the white spaces to a series of narrow intervenular patches and six reduced outer lunules, giving the wing a very gray appearance. On many specimens there is no red at all; on others the whitish costal openings and a small patch in the terminal black band between each of the nervules is a brick-red.

Habitat. Country round Spokane Falls, Washington Territory, July 26.

Alar. exp. ♂. ♀ 2.00 to 2.20 in.

Mr. Strecker's figure very fairly represents the upper side of the females here described, but the under side is totally unlike, so far as the secondaries are concerned. In all I have seen from the locality quoted there is more black than white on the secondaries beneath. None of them have so much red ; many none at all, and not one shows any trace of the streak near the inner margin. As I have not access to the description of the ♀ by Felder, I forward a series to the editor of PAPILIO. Should he find them to differ largely from Felder's description, I would suggest the name of "*suffusa*" for this variety, as it is very constant.

Description of Larva.

General color green. Head green, covered with small white points; mouth parts dusky; low down on each side a curved row of four black dots.

Body clear green, tinged with purplish, and with two lateral yellowish-white stripes. In the dorsal green stripe the purplish tint shows itself as a faint dorsal line, and on the edge of the upper lateral line, leaving clear green between. The upper edge of the upper lateral stripe is clean cut; the lower edge more diffuse, shading into green, and that color being tinged with purplish along the upper edge of the lower lateral stripe, which is somewhat broader than the upper one and better defined. Anal segment somewhat horny, narrow, and slightly notched at the tip. Venter, dusky green. Pro-legs black. Abdominal legs dusky green.

Length 1.00 inch.

Note.—I have in this paper assumed that all the damage done to the yellow pines was caused by *P. Menapia*. It is only fair to state that, on the edge of the timber, north of Spokane Falls some three or four miles, I came across a large *Bombycid* larva which denudes the foliage in a similar manner. From one small pine, not more than twelve feet high, I took some thirty specimens, and might have taken a hundred. These were in a district where *P. Menapia* was uncommon. We did not have time to make any extended search on other trees, but it may be possible that a portion of the damage has been done by these insects. It could not have been common, however, in the affected district, as a close watch on the habit of *Menapia* did not reveal its presence. I have a number of cocoons of this insect, from which I hope to raise the imago, which is probably allied to the genus *Parorgyia*. If I succeed, I will put the observations on record.

San Francisco, August 9, 1882.

ON THREE SPECIES OF EUCHÆTES.

BY A. R. GROTE.

I bring together here the descriptions of three species of *Euchætes* which are apparently rare, and possibly not sufficiently distinct. Both *Spraguei* and *Abdominalis* differ from Dr. Clemens' *Eglenensis* in having the internal margin of primaries striped as well as the costa. *Eglenensis* agrees with *Abdominalis* in having the costa yellow. Dr. Clemens calls it "pale luteous;" but in *Abdominalis* it is "dark yellow," as I have described it. Except this character, which might be held to be variational, the descriptions of the two are very similar, and their identity might be assumed were it not for the stripe along internal margin in *Abdominalis.* This, although narrower than the costal edging, is quite plain in my species. Away from my books and collections, I thought that I was possessed of a new *Zygænid* type when I took the specimen in Alabama.

A table of the three species might be made as follows:

Fore wings bluish cinereous or lead color.

Fore wings with costa and internal margin striped.

Stripes crimson.—*Spraguei.*

Stripes dark yellow.—*Abdominalis.*

Fore wings with costa striped.

Stripe pale luteous.—*Eglenensis.*

1. EUCHÆTES SPRAGUEI, Gr. Can. Ent., vii., 200.

♂. Allied to *Elegans*, but entirely stone color, like *Egle.* Fore coxæ, head at base, two thoracic vittæ, costal and internal margin of fore wings crimson. Abdomen above red, with dorsal black dots. Kansas. Prof. Snow.

2. EUCHÆTES EGLENENSIS, Clem., Proc. Ac. N. S., Phil., 533, 1860.

Bluish cinereous. Palpi bright reddish at the base, with dark cinereous tips. The occiput and post orbits are red orange. The external edge of the fore wings is pale luteous. The abdomen above is bright red-orange, with a dorsal row of small black spots and one on each side; beneath, cinereous. The thorax beneath and the anterior coxæ are tinged with red orange. Texas. Captain Pope's collection. Smithsonian.

3. EUCHÆTES ABDOMINALIS, Gr., Can. Ent., 124, 1871.

♀. The wings are lead color; in certain lights the primaries show a bluish reflection, as in *Ctenucha.* The costal region of the fore wings above and below is striped with dark yellow, as in the internal margin. The hind wings are concolorous. Abdomen above orange, with a dorsal and lateral series of black spots; beneath, lead color. Palpi, throat and head behind and between the antennæ bright orange; front dark, as are the palpal tips. Legs dark lead color. Fore coxæ orange. Collar and tegulæ more or less evidently edged with orange. *Expanse* 44 mil. Alabama. A front wing and a denuded hind wing, mounted on card-board, are all that remain of the type, which I discovered among some broken specimens in a forgotten box.

There is a curious resemblance between the species of *Ctenucha* and *Euchætes*, so that the darker forms of the latter genus might be mistaken for *Zygænids* were it not for the *Arctia*-like abdomen. The denuded hind wing of my type of *Abdominalis* is 8-veined; veins 3, 4 and 5, equidistant at base, thrown off from extremity of median vein.

The three "species" here discussed are the prettiest in the genus, and of the three *Spraguei* is the handsomest and most distinctly colored.

ON THE EARLY STAGES OF PAPILIO RUTULUS.—BDV.

BY HENRY EDWARDS.

ON EXCLUSION FROM EGG.—Head very large, black, shining. Second segment with two tubercles on the sides in front. Body brownish-black. Segments 3, 4, 5, 10, 11, 12 with two tubercles each, arranged sub-dorsally. Extending from the seventh to the ninth segment is a small, but conspicuous, triangular white patch, the vertex of which is directed posteriorly. Feet and legs black.

AFTER FIRST MOULT.—The head now becomes pitchy, the body streaked with shades of brown, longitudinally; the two tubercles on second segment are chestnut-brown, and the whole of the processes brighter and more glossy. The white triangular patch is larger and more distinct, and the posterior segments are delicately mottled with brownish.

AFTER SECOND MOULT.—Head chestnut-brown, with pinkish tinge. The tubercles of the second segment are larger than before, and have become yellowish-brown in color. Between them is a yellowish corrugated fold, and on the dorsum, at the base of the longer tubercles, are two smaller ones, also chestnut-brown. Body brownish dorsally, with a green tint throughout; laterally it is pale apple-green. The third segment has six tubercles, the middle and lateral being exceedingly small. Fourth segment swollen, the body here attaining its greatest size. This segment has also six tubercles, the two dorsal being the smallest. The fifth segment has four tubercles, the smaller pair of which are placed anterior to the other. The triangular patch has now become cream-yellow, and encroaches in a point posteriorly on the ninth segment. Segments 9, 10, 11, 12, 13 have each two tubercles, which are directed backward, and increase posteriorly in size, so that those of the thirteenth segment are double the length of those of the ninth. Mouth parts, legs, as well as the whole of the under side, pale bluish-green.

AFTER THIRD MOULT.—The head is now pale bright chestnut, with a decidedly pinkish tint, and the mouth parts of a deeper and more decided green. The body has assumed a pale apple-green color, the tubercles are brighter and more approaching to brownish-orange, and the triangular patch is buff, with some streaks of green running through it. The tubercles of twelfth and thirteenth segments are now yellow, and at the base of those of 5, 9, 10 and 11 are some bluish dots. Upon being touched, the young larva exhibited the usual retractile horns. These were situated at the base of the head, between it and the second segment. They were pale orange, much darker at the tips.

I regret that I could not carry these larvæ further than this stage. I was called away from home, and on my return found them dead. Three larvæ were obtained from eggs observed to be deposited by the ♀ upon *Alnus viridis.* The following is the record of changes:

Eggs deposited July 8.
Larva hatched July 13.
" first moult July 15.
" second moult July 18.
" third moult July 22.
" showed retractile horns July 24.

THE PREPARATORY STAGES OF PLUSIA BILOBA.—STPH.

By G. H. French, Carbondale, Ill.

EGG.—Nearly globular, the base slightly flattened, the apex slightly inclined to a blunt cone. At the apex is an irregularly punctured space; from near the base run a number of ridges, about twenty of which reach the punctured apical space, many of them not reaching this point, as they are the same distance apart throughout. The depressions between the ridges are filled with a series of quadrate punctures in the centre of each of which is a small elevation. There is no apical depression. Size .02 of an inch in diameter; color white, with a faint creamy tinge; duration of this period five days.

YOUNG LARVA.—Length .07 of an inch. Body white or with a very pale tinge of green, head and top of joint two black, piliferous spots black, showing very prominently a single black hair arising from each. Legs 12, for which reason the larva loops when walking; when at rest the front part of the body is generally elevated, though not straightened out like a geometrid. Before eating the food placed in the dish each larva ate a portion, if not all, of its egg-shell, after which it remained quiet for a time. Duration of this period three days.

AFTER FIRST MOULT—Length .16 of an inch. Head and top of joint two pale amber, the jaws a little darker. Body pale translucent green; the piliferous spots large tubercle-like, tipped with black, and each suporting a black hair. The body nearly cylindrical, truncate posteriorly. Duration of this period three days.

AFTER SECOND MOULT.—Length .33 of an inch. Color pale green, the dorsal line darker. Subdorsal line whitish, as also two other lines in the dorsal space. Stigmatal line greenish-white through the middle of the body, appearing to be composed of two lines. Above the stigmatal lines, on joints 5 to 9, is a bright black spot on each joint, the last one small. Piliferous spots concolorous with the body; the hairs pale, each two-thirds as long as the diameter of the body. Head pale amber, very faintly mottled. Jaws and ocelli brown. Duration of this period three days.

AFTER THIRD MOULT.—Length .55 of an inch. Color pale green as before, though a little more prominent. As in preceding period the dorsal line darker green, the subdorsal white, with two more white lines each side in the dorsal space, these lines a little more distinct than before; stigmatal line as before. In the middle of the subdorsal space is a clear green stripe, bordered each side by a whitish line, and containing the black dots on joints 5 to 9 as before. Head greenish amber, mottled a little with very pale brown, with a more or less distinct dark brown stripe on each side outside of the ocelli. Thoracic legs dark brown, the posterior pair the darkest, the anterior mottled a little with green. Prolegs green. Substigmatal space with a few white dots. Duration of this period four days.

AFTER FOURTH MOULT.—Length .70 of an inch. Color green, the white lines as before, except that the part below the stigmata of the double stigmatal line are nearly obliterated and the lines on the sides and back are connected by spurs, all the light lines faint. Head green, a jet-black stripe on each side connecting in front, antennæ black, the interjoints green. Thoracic feet black, the others green. Legs 12, wfth no trace of the first and second pairs of abdominal legs. The whole body is covered with a short, fine pile which is brown on the sides, but white on the dorsum. The black lateral spots are still present, but are smaller than during last period. Stigmata green, circled with black.

MATURE LARVA.—Length .95 of an inch. The body is from .10 to .12 of an inch in width from the middle joints to the anal, but tapers from the fifth joint to the head, this being .06 of an inch across by .04 deep. The second joint is without cervical shield. The anal extremity is almost truncate. The color remains about the same as at the beginning of this period, save that the white lines are more obscure and the lateral black spots show but little, if any. The other characters are the same as soon after the fourth moult. Duration of this period four days.

CHRYSALIS.—Length .75 of an inch; length of wing case .50, the leg and antennæ case extending .05 of an inch beyond. In shape cylindrical, the abdomen conical. The dorsal and lateral portions of the cephalothorax are finely shagreened, with the dividing lines between the plates shining. The basal joints of the abdomen are somewhat shagreened, but they gradually become shining or polished from before backwards, each one with a slight elevation anteriorly. The last segment ends in a tubercle, which is tipped with a single hook, with which it fastens itself to the loose cocoon. The wing cases cover the ventral portion of the first five abdominal joints, the leg and antennæ case projecting over the sixth. Depth through the thorax .20; 1st abdominal joint .19; 2d joint .21; 6th joint .18 of an inch. Color dark blackish-brown, the anterior portion of the wings and legs a little paler, while the spaces between these is somewhat yellowish, as also the parts between the terminal joints. Duration of this period from the time of beginning to spin nineteen days. The cocoon was loosely spun of fine white silk, and not enough of it to conceal the chrysalis. Two days passed from the time the larva began spinning to the time the last larva skin was moulted and the chrysalis was to be seen.

The eggs were deposited April 27th, and the moths hatched June 8th, making a period of forty-two days from the egg to the imago. Allowing three days from the time the moths emerge before eggs for another brood are deposited, would give us forty-five days as the whole period from egg to egg, though I am of the opinion that it is a few days longer, from the condition of the moth depositing the eggs from which the above notes were taken. This would give us two more broods of moths this season, with another brood of larvæ that probably hibernates in the chrysalis state, or four broods in a season. This is making little or no allowance for delays in some of the larvæ in passing from one state to another; in fact, those that were healthy were very regular in their moults. From larvæ found in the garden at different times there seems to be some irregularity, hence there would be in some cases of retarded development only three broods, while in others four.

The larvæ seemed to be easily affected by external conditions. Out of eighty passing the second moult, I obtained only four chrysalids, and only two of those produced imagines. It should be said, however, that about the period of the third and fourth moults the weather was rainy most of the time, and all my larvæ of other species were somewhat affected by it, but none so much as these. Larvæ found in the garden during that time were affected in the same way.

The food plant not being known, quite a number of tender leaves were at first offered the young larvæ. Among these parsnip, larkspur and clover were eaten, though towards the last, lettuce was given them, as they were found on that. They were, however, fed most of the time on parsnip leaves, as they seemed to prefer that plant.

"TINEIDÆ" OR "TINEINA."

By V. T. Chambers.

I desire to offer a few remarks suggested by Lord Walsingham's paper in the May number of Papilio. I am so completely out of Entomology now, and have done so little in it for the last two or three years (beyond arranging some old notes for publication) that I do not feel qualified to discuss the subjects embraced in Lord Walsingham's paper, and what I shall now write is simply the impressions left upon my mind by former studies.

I am perhaps too indifferent to nomenclature, and care nothing about whether we write TINEINA or TINEIDÆ. The name does not concern me so long as the thing named is understood, and I shall not enter upon the question as to which of these two names we shall use. But the question whether there is in nature a separate and distinct group of Lepidoptera of higher than generic rank to which either name can be appropriately applied, is one of more importance. Following the authors of the *Nat. Hist. Tin.*, Stainton, Zeller, Frey, Douglass and others (acknowledged authorities as to the insects in question), I have usually written TINEINA. Lord Walsingham, with the majority of entomologists, prefers to write TINEIDÆ, a name which in the *Nat. Hist. Tin.* is applied to a single family of the supposed group. Uniformity is better than priority, and I think it will be more easily achieved by following the authorities above named than by adhering to the older name of TINEIDÆ for all of the various and heterogeneous families forming the supposed group—if there is in nature such a group. Is there?

Lord Walsingham thinks there is. With great respect for the authority of so distinguished an entomologist, I differ with him, and whilst I have used the name TINEINA in a loose and general way for all small moths not clearly belonging to any of the higher groups, I do not believe that there is any such distinct group as TINEINA (or TINEIDÆ). The HETEROCERA are sufficiently distinct, perhaps, from the RHOPALOCERA, though there are "connecting links" even here; but, in my opinion, there is no line separating the TINEINA (I use the name through force of habit) from other HETEROCERA; and the belief that there is has hindered the study of these small moths. Because of their obscurity, and under the impression that they form a distinct group, a knowledge of which was not necessary to a knowledge of the higher HETEROCERA, students of the latter have generally neglected them. But in my opinion they are no more distinct from the higher HETEROCERA than these are from each other; and the *Tineidæ* (restricted), *Gelechidæ*, etc., take rank as families of HETEROCERA just as do the *Bombycidæ*, *Noctuidæ*, *Tortricidæ*, etc., and not as sub-families of a family TINEINA or TINEIDÆ. The line which separates the higher *Tineidæ*, *Gelechidæ*, etc., from the *Tortricidæ*, *Phycidæ*, etc. (sometimes very indistinct), is no more strongly marked than the lines which separate these latter from each other. The name *Tineidæ* probably came to be employed at a time when comparatively little was known about these small moths, and they perhaps appeared sufficiently distinct from the larger forms to give rise to the impression that they were, in fact, a distinct group; and the use of a name for such supposed group has perpetuated the belief that it had a real existence. It is not my purpose, either now or hereafter, to give the facts and reasons which lead me to the conclusion that there is no such group, as in all probability this is my last contribution (such as it is) to entomological literature; but I wish to offer some remarks upon some of Lord Walsingham's suggestions on this subject in the paper in the May number of PAPILIO. I would have expressed my meaning more clearly and grammatically if I had written in the paper in the *Journal of the Cin. Nat. Hist. Soc.*, referred to by Lord Walsingham, "TINEINA is a name applied to a large group," etc., instead of "TINEINA is (sic) a large group," as quoted by his lordship. It may be as suggested by him (*in lit.*) that "is" is an error of the printer, but it is just as likely that it is the result of my own haste and carelessness in writing. This much, *en passant*, as to the grammar; my present object is to consider briefly some of his lordship's reasons for believing that such a group as the supposed "TINEIDÆ" higher than a genus has an actual recognizable existence as separate and distinct from the higher HETEROCERA.

Lord Walsingham writes (*loc. cit.*): "What is a family?" Regarding it in its accepted sense as "an assembly of genera," each of which possesses in greater or less degree the characteristic feature or features of one and all of them, we must ask ourselves whether any one, or more than one, characteristic generic feature pervades the whole group of genera which have of late been massed together under the name "TINEINA." For myself, I must answer that I do not now remember any such feature which is not equally characteristic of other HETEROCERA, unless indeed it be the small size of most of them. And even if size be regarded as of "family" importance, there are many insects usually included in TINEINA which greatly exceed in size a great many HETEROCERA of "higher" families. If we adopt size as the criterion of a right to be placed in TINEINA, then all species of Dr. Clemens' genus *Anaphora* will have to be excluded. My species *Blastobasis gigantella* will be excluded, whilst all other species of the genus will be included. These species of *Anaphora* and *B. gigantella* equal or exceed in size the average size of species of *Tortricidæ*, *Pyralidæ* and *Phycidæ*, and so do many other "TINEINA" which I have not time now to specify, and they equal in size many *Noctuidæ*. I cannot agree with Lord Walsingham that "it is surely easier at first sight to separate any of these ('*Tineidæ*') genera from those of other families than it is to determine with readiness and certainty the true position of a *Bombycid* (which approaches the *Noctuidæ*), a *Noctuid* (which approaches the *Pyralidæ*) or a *Pyralid* (which approaches the *Phycidæ*)." Indeed, to instance *Anaphora* again, it appears to me that at first sight I should rather refer it to the *Noctuidæ* than to the *Tineina*; and I confess myself, at first sight (for my examination of the insect was brief and incomplete) I was utterly unable to determine in what family or group to locate the insect mentioned by me in the foot note on page 16 of the paper in the *Journal of the Cincinnati Nat. Hist. Soc.* Possibly it may be related to *Euplocamus*, and on account of its large size, and for other reasons, I have always doubted whether *Euplocamus* ought to be included in the *Tineina*. Lepidopterists are not by any means all agreed as to the upward limits of the *Tineina*. Species and genera which some place in *Tineina* are by others placed in *Tortricidæ*, *Pyralidæ* and other groups. Mr. Stainton and others place *Orthotelia* and *Phibalocera* in *Tineina*. Stephens and others have placed them in *Tortricidæ*, from which "at first sight" I see no reason to separate them. Other instances will doubtless occur to those who are familiar with the *Tineina*, but I write on the spur of the moment, after having read Lord Walsingham's paper, and from recollection only when I am no longer familiar with the subject, and without any special research. *Brenthia*, Clem., is the equivalent of *Limæthis*. With Dr. Clemens, I, on account of its size, cilia and ornamentation, placed it in *Tineina*, where it has been located by some other entomologists, though more commonly it is placed in *Pyralidæ*. *Hyale coryliella*, Cham., is probably *Menestra tortriciformella*, Clem., and was placed by both Dr. Clemens and myself in *Tineina*, where, I am now satisfied, it does not rightly belong.

Lord Walsingham continues: "Whether by their small size" (which we have seen fails to characterize them), "their long cilia" (which are wanting in many of the larger genera, and are not longer than in many *Tortricidæ* or *Phycidæ*), "their slender and upturned palpi" (though multitudes of them have drooping palpi or no palpi at all) "the leaf mining habits of the larvæ" (though a majority of them are not leaf miners at all, while some larvæ of *Tortricidæ*, etc., are at first), "the neuration of their wings" (differing widely among different genera as *Nepticula*, *Cuniostoma*, *Lithocolletis*, *Gelechia*, *Tinea*, etc., and in some of the higher genera differing little or not at all from that of *Tortricidæ*, *Pyralidæ*) "and ornamentation of their wings" (ranging from the brilliancy of *Lithocolletis* and *Lithaciopteryx* to the somber dullness of many *Tineidæ*), "there is in each genus associated with the Linnean name '*Tinea*' some peculiarity by which its members can without difficulty be recognized as possessing what I think may be properly called a family resemblance." It may be so, but I fail to detect the family resemblance of a *Phyllocnitis* on the one hand, and a *Tinea* or *Euplocamus* on the other, more easily than I can that between *Anophora* and many *Noctuidæ*, and when we come to trace their life histories and compare their larvæ, the attempt fails more completely still. All are LEPIDOPTERA HETEROCERA; to that extent there is resemblance, but that is about all that I find between numerous genera usually "associated with the Linnean name *Tinea*;" and I do not find as characterising the so-called group *Tineina* any characteristic, or combination of characteristics, which I can "grasp" as constituting it a family or group of families. It appears to me to be a purely arbitrary and heterogeneous assemblage of families differing as widely from each other as they do from *Noctuidæ*, *Phycidæ*, etc. In size and form and neuration, and other respects, they grade up from the smallest and lowest, passing as gradually into the higher groups *Tortricidæ*, etc., as the latter do in these respects into families still higher in the scale. And although by using the termination "idæ" instead of "ina" we secure a "termination uniform with *Sphingdæ*, *Bombycidæ*," etc., we do not secure a "family" of equal value with those families, but only a large heterogenous group composed of numerous families (*Gelechidæ*, *Tineidæ* restricted, etc.,) the value of which is at present unproved.

It appears to me most probable that the small size, long cilia, etc., of such genera as have these characteristics are the results of degradation, not from a common form, but from a variety of originals, and in different directions; that the student will be greatly aided, to say the least, by a study of their early stages and development, and that this course is most likely to give us the key to their relationship—that is, to their natural classification. Such study, so far as I have prosecuted it, tends to the conclusion that instead of being a natural group of related families it contains at least five distinct families, degraded from as many distinct originals, and perhaps less related to each other than they are to some of the higher groups.

With great deference, therefore, for the opinions of so distinguished an entomologist as Lord Walsingham (and, no doubt, of many others), I am compelled to differ with him as to many statements in his interesting paper in PAPILIO, and I avail myself of this opportunity to state my own views more explicitly than I have elsewhere done. I will add that I have somewhere (I cannot now give the citation) seen some remarks by Mr. Stainton upon this subject, in which, as I remember, after briefly mentioning most of the characteristics of the supposed group alluded to by Lord Walsingham as above quoted, he concludes that the ciliation of the wings affords the best criterion, but admits that that fails sometimes. I think it is only a mark of degradation, and occurs just about in proportion as the species is more or less degraded, and does not indicate relationship.

NOTES ON PAPILIO OREGONIA.—*EDW.*

BY R. H. STRETCH.

During my recent trip to Washington Territory with Dr. Hagen I was fortunate enough, in conjunction with Mr. S. Henshaw, of the Boston Natural History Society, to take some seventy-five specimens of this insect (which are in the hands of Dr. Hagen, of Cambridge) and to raise it from the larva.

We first saw the butterfly on the wing at Umatilla, Oregon, on the south bank of the Columbia River, June 24th, capturing thirty-six specimens from flowers of a species of evening primrose or fluttering round a species of *Artemisia*. On the north bank of the river, being then in Washington Territory, we took as many more on June 26th, from thistle heads, and I saw a female deposit one egg on *Artemisa*. On July 4th, Mr. Henshaw found one half-grown larva on *Daucus*, at Nelson's, about ten miles north of Yakima City, and July 5th I found another, preparing to pupate on *Artemisia*; but not the same species of plant on which I saw the egg laid. I was successful in raising a very fine example from this larva. On July 16th and 18th the butterfly was either seen or captured on the Yakima River, about half way to its junction with the Columbia, but it was quite rare. When at Spokane Falls I saw a number of specimens collected by Mr. Ricksecker. These localities show a wide range. They are all on the great basaltic plateau which occupies the central portion of the Territory and is essentially the home of the *Artemisias*.

The species is probably single brooded in this area.

Description of the Larva.—Length about two inches. Horn orange-yellow, bifurcate.

Entire larva pale yellowish-green, inclining to bluish round the transverse markings and on the ventral parts.

Head with two vertical, frontal black lines, divergent at their lower ends, and a lateral vertical black line, with a black dot between each of the lines just above the mouth parts.

Second segment with two transverse black lines, each with a terminal black dot laterally, and at the horn opening a slender transverse black line with three heavier longitudinal branches, like the top of the capital letter T. A lateral flat dull yellow tubercle.

Third, a strong black transverse velvety black line, evenly cut behind, with four indentations in front, each filled with a yellow tubercle, with a black spot low down laterally, supplemented above with a yellow tubercle. Posterior suture black.

Segments four to twelve alike, except that the black markings gradually diminished in strength posteriorly; sutures black when the larva is extended. The yellow tubercles indenting the black transverse line on segment three cut it up into five transverse black spots, the lateral one on segment four being large, the other similar ones smaller, linear and oblique; below these is a third yellow tubercle, followed by a linear black spot, so that each of these segments has a transverse series of seven black spots, the dorsal one the largest, between which are three lateral rows of yellow tubercles.

Thirteenth segment with a similar row of black dots and a terminal black line.

All the legs green, with black tips and a black dot at the base of each.

Compared with the larva of *Papilio machaon* given in the *Butterflies of North America*, the only apparent difference is that whereas in Mr. Edwards' figure the transverse black lines are continuous and partially enclose the yellow tubercles, in the larva just described the tubercles on all the segments back of the third, break up the transverse line into a series of black spots. Unfortunately, the immature larva captured by Mr. Henshaw escaped a few hours later, and before I found the second example, but it was apparently identical.

The particular larva raised had a hard time of it. It attached itself to pupate and spun its band; but the jolting of the wagon detached it, and it was found at the bottom of the box. I glued the anal segment down and supplied an artificial band. This experiment was successful, but when the pupa emerged, July 11th, it of course fell to the bottom of the box, having no silken attachment to seize. I again glued the pupa down when it showed signs of emergence, supplying the band, and in spite of all accidents secured a magnificent female imago, on July 25th. Unfortunately, I could not make a drawing of the pupa, which was green, shaded with yellow; the green obtained most strongly on those parts which correspond to the black markings of the imago, and the yellow to the yellow markings, there being two broad mottled yellowish stripes on the side of the abdomen above. The wing cases were grayish green, having a striated look. The right hand figure of the pupa of *Machaon* in Edwards' *Butt. N. Am.*, gives a good idea of the pupa if green and yellow be substituted for the shades of brown. The colors changed but little at maturity.

SAN FRANCISCO, August 8, 1882.

NOTES ON LEPIDOPTERA.

COLORADIA PANDORA, Blake.—I caught to-day a very fine ♀ example of this rare and interesting moth at Soda Springs, Shasta Co. I think such a capture worthy of record, as few examples of this species are known to exist in collections. JAS. BEHRENS, San Francisco, August 22, 1882.

PAPILIO POLYDAMAS IN FLORIDA.—"I have previously thought that this species had been erroneously introduced into our lists, and I had struck it out of my revised synopsis, but to-day I received a specimen from Dr. Wittfield, of Indian River, who has taken several examples. Hitherto it has been regarded as belonging to the United States, on the authortiy of Bois. Lec, but of late its occurrence has been discredited. These authors give the food plant as a species of *Aristolochia*. I hope yet to obtain the eggs, through the energy of Dr. Wittfield. W. H. EDWARDS, Coalburgh, June 25, 1882.

NOTE ON THE GENUS HERRICHIA.—This term, which I have proposed and limited on page 64 of my new Check List, is, I found too late to make the correction, previously used by Dr. Staudinger. I beg those who use the list to alter the name to *Euherrichia*. A. R. GROTE.

EUEDWARDSIA, n. g.—Tibiæ unarmed; eyes naked, somewhat narrow. Vestiture hairy; front with a clypeal protuberance below a shallow indentation. Wings entire, produced at apices; rather short and broad. Forewings with the costa somewhat depressed; apices produced; outer margin rounded. Color, shades of yellow or orange. Type *E. Neumoegeni*, Hy. Edw. Belongs to the *Heliothinæ*. A. R. GROTE.

PAPILIO ALBANUS, Feld.—This is a common form of *P. Eurymedon* Bdv., and hardly to be distinguished from the type. It differs in having the primaries "slightly more protracted at the apex, the secondaries being more widened in the anal region, by their longer and much narrower tail, the vittæ being broader on both sides, and by the marginal spots approaching nearer to the margin. We collected two ♂. *Felder*, *Reise Novara*." The ♂ ♂ taken in the mountains, or at an elevation of 2000 feet, are nearly always of this form, the ground color of the wings being also more clearly white, and the insect generally a little smaller. HY. EDWARDS.

NOTICE TO SUBSCRIBERS.

Owing to the length and importance of some papers in the present number, many matters have been held over, among which are several book notices, including one on Mr. A. R. Grote's "NEW CHECK LIST OF MOTHS," which is now ready for distribution.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] October, 1882. [No. 8.

DESCRIPTIONS OF NEW SPECIES OF N. AM. HETEROCERA.

By Henry Edwards.

FAM. ÆGERIADÆ.

ÆGERIA CANDESCENS. n. sp.

Fore wings purplish-brown, with a transparent median streak as far as the cell, edged on the internal margin with whitish. The discal mark purplish-brown, edged outwardly with orange-red. Transparent space behind the cell very small, reduced to four narrow streaks. Fringe golden brown. Hind wings with the margin rather broad, purple brown. Head blackish-brown, collar, palpi and orbits of eyes clear white. Thorax and abdomen blackish-brown, the latter with the segments all rather broadly edged with greenish-white. Caudal tuft wholly black. Fore wings beneath with golden lustre, and the discal mark bright orange, shading into purplish-brown on margin. Hind wings as on upper side. Fore coxæ white outwardly, the rest of the legs blackish-brown, with golden scales, the tarsi narrowly banded with black.

Exp. wings, 15 m. m.

1 ♂ Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

PYRRHOTÆNIA BEHRENSII. n. sp.

Fore wings entirely opaque, rich golden-green, purplish-brown posteriorly, with the internal margin broadly orange-red, narrowing in width towards the internal angle. The hind wings are also stained with orange-red along the abdominal margin. They are perfectly transparent, the outer portion of the margin and the fringe golden-brown. Beneath, the fore wings are rich purplish-brown, with the base and about half of the costal and internal margins orange-red. The hind wings have a golden reflection, with the costal and abdominal margins orange-red. Head brown-black, as are also the antennæ. The palpi, collar, orbits of the eyes are orange. Thorax bronze-green, with a narrow stripe on each side above, and the whole of the lower side orange-red. Abdomen also bronze-green above for the three basal segments, the sides and lower surface of these being bright orange-red. The posterior segments are all orange-red, above and below. Caudal tuft orange-red, black at the sides. The fore coxæ, middle tibiæ and a band on the hind tibiæ are bright orange, remainder of legs bronze-black.

Exp. wings, 20 m. m.

2 ♂ Soda Springs, Shasta Co., Calif. (J. Behrens.)

One of these examples has the 4th, 5th and 6th abdominal segments a pale buff instead of orange, but I think this an accidental variation. I dedicate this exquisite species to my old friend, Mr. James Behrens, who has done so much towards an investigation of the entomological fauna of California.

FAM. ZYGÆNIDÆ.

LYCOMORPHA RATA. n. sp.

Allied to *L. constans*, Hy. Edw., but differing by the following characters. The disc of the wing in the present species is dull orange, with the costa black, widening a little towards the apex, and joining the rather broad posterior marginal band. Secondaries also broadly margined with black. Head, antennæ, thorax, legs and abdomen, above and below, blue-black. Collar, patagia and sides of abdomen dull orange. Lower side of the wings same as the upper.

In *L. constans* the costa of primaries is orange, as well as the basal ⅔ of the wing; the costa *only* of the secondaries is orange, and the abdomen is wholly blue-black.

Exp. wings, 18 m. m.

Four examples. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

LYCOMORPHA LATERCULA. n. sp.

Primaries brick red. Posterior margin broadly, internal margin narrowly, and apical 3d of costa blue-black. Secondaries blue-black, except the costal edge, which is brick-red. Under side the same as the upper. Antennæ, head, thorax and abdomen wholly blue-black. Legs with a brownish shade.

Exp. wings, 20 m. m.

Three examples. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

FAM. BOMBYCIDÆ.

PSEUDOPSYCHE. n. genus.

Antennæ plumose, the setæ few, rather long, and bifurcate at their tips. Thorax short and broad with the vestiture squamose. Abdomen shorter than the hind wings, broad at the base and becoming abruptly pointed. Fore wings much produced at the apex, wider than the hind pair, which are rounded on the anal angle, and produced at the apex. Tibiæ unarmed, but clothed with rather long spreading hairs.

PSEUDOPSYCHE EXIGUA. n. sp.

Wholly brassy black, the scales of the primaries with somewhat metallic points.

Exp. wings, 13 m. m. Length of body, 4 m. m. 2 ♂. San Francisco Mts., Arizona.

A singular little insect, difficult to refer to any known family. I believe, however, that I am right in placing it in the *Psychidæ*, but this cannot be established until the ♀ is known, and some observations have been made upon its life-history.

CLISIOCAMPA INCURVA. n. sp.

It is rather a hazardous experiment to describe a species of this genus, without a knowledge of the preparatory stages, but in the present form I find some characters, which, after a careful comparison with the types of the described Pacific Coast species, (all of which are contained in my collection,) entitle it, I believe, to a specific rank. It is most nearly allied to *C. erosa*, Stretch, and *C. fragilis*, Stretch, but differs abundantly from both. The ground color of the ♂ is pale fawn color, of the ♀, a darker shade, inclining to a brownish tint. The basal space in both sexes is paler than the rest of the wing. The strongest character is afforded by the anterior line, which is curved, and starting from costa about 4 m. m. along its edge from the base, turns below in the middle, and *passes quite into the base of the wing* on the internal margin. In all the other N. Amer. sp. there is a space on the internal margin between the junction of this line and the base of the wing, and I believe it is in the position and shape of the two lines of the primaries that the best characters for separating the species in the imago state may be found. The outer band in the present form is more regular, bent a little outwardly in the middle, and in the ♀ slightly dentate, the anterior band being without teeth in both sexes. In this respect it approaches *C. fragilis*, but in the Nevada species there is a space between the junction of the anterior line, and the base of the wing, while the ♂ is totally different. (See "PAPILIO" Vol. I., p. 64). I have no doubt of the validity of *C. incurva* as a species, but, where it is possible, the most careful attention should be given to the species of this genus in their earlier stages.

Exp. wings, ♂ 28 m. m. ♀ 34 m. m.

1 ♂ 1 ♀ Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

ŒDEMASIA PERANGULATA. n. sp.

Primaries greyish white, with a fawn-colored shade along the internal margin, especially towards the base of the wing. The anterior lines are obsolete, the posterior is broken on the costa, but its course may be traced by a series of imperfect streaks, nearly to the posterior margin, thence about the middle of the wing it forms a very acute angle to the centre of the internal margin and is slightly dentate outwardly. There is a conspicuous discal mark, some streaks near the apex of the costa, and others near the internal angle, blackish-brown, fringe fawn color. Secondaries, sordid white, with a blackish blotch on anal angle, and the fringes and margin dusky. Beneath, the wings are sordid white, shading into dusky on the costa, the primaries broadly so, and enclosing some blackish streaks. Antennæ fawn color. Thorax brownish fawn color, mottled with darker shade, the collar brown-black. Abdomen sordid white, shading into fawn-color at the base. Legs fawn color, mottled with brownish.

Exp. wings, 38 m. m.

1 ♂ Colorado. Coll. Hy. Edwards.

COSSUS MUCIDUS. n. sp.

Size small. Primaries grayish-brown, mottled with darker shades, the margins being broadly pale, and of a purer gray tint. Reaching from the base to the cell on the costal half of the wing is a conspicuous whitish shade, the whole of the wing flecked with greyish and brown atoms. Fringe alternately brown and sordid white. Secondaries dusky white, mottled with brown. Thorax and abdomen concolorous. Beneath, the primaries are mottled with brown on a dusky ground, and the secondaries are as on the upper side. Abdomen considerably longer than the lower wings in both sexes. In the ♂, there are indications of brown rings at the junction of the segments.

Exp. wings, ♂ 36 m. m. ♀ 40 m. m.

Length of body, ♂ 20 m. m. ♀ 25 m. m.

2 examples. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

EUCHÆTES PUDENS. n. sp.

Closely allied to *E. collaris*, but considerably smaller. Clear white, with the costa pale buff for about one-third of its length; the collar also buff, this color being by no means extended to the thorax, as it is in *E. collaris*. Abdomen yellowish-white, with the abdominal spots very small and indistinct, being reduced to mere points. Fore legs only slightly stained with buff.

Exp. wings, 28 m. m.

1 ♂. S. W. Texas. (I. Boll.) Coll. B. Neumoegen.

I have examined a large number of *E. collaris*, and compared them with the present specimen. In all I find the costa yellow almost to the apex, and the tegulæ and upper half of the thorax well marked with the same color, neither of which characters obtains in the present form.

FAM. NOCTUIDÆ.

STIBADIUM AUREOLUM. n. sp.

Smaller and more delicate than *S. spumosum*. The anterior two-thirds of primaries are pinkish-brown, with fleckings of whitish scales. The t. p. line is whitish, bent in a sharp angle on costa, thence oblique to internal margin. Behind this is an oblique broad yellow stripe, with a golden sheen, edged posteriorly by a pinkish-brown sub-marginal band, the apex of the wing being occupied by the yellow streak. Fringe brown, speckled with white. Secondaries dull fawn color, palest at base, with an indistinct median line. Fringe stone color. Beneath, the primaries are dusky, the yellow oblique stripes of the upper side being faintly shown. Costa with a golden sheen. Secondaries wholly pale fawn color. Thorax and abdomen concolorous.

Exp. wings, 28 m. m. Length of body, 13 m. m.

Four examples. Prescott, Arizona. (I. Doll.) Coll. B. Neumoegen.

PLUSIA SCAPULARIS. n. sp.

Primaries bright fawn color, with some golden shades near the internal angle. From near the apex a bright chestnut-brown shade extends to the internal margin, and a large blotch of the same color rests on the middle of the internal margin, enclosing the entire scapula-shaped silver spot, the dark shade not reaching to the costa. The lines are very faintly indicated, the t. a. being most apparent, and shown by a little darker shade than the ground color of the wing. Secondaries fawn-color, with darker shading outwardly. Under side of wings yellowish fawn color, the primaries with dusky shade. Thorax and abdomen concolorous.

Exp. wings, 36 m. m. Three examples.

Washington Ter. (H. K. Morrison.) Coll. Hy. Edwards and B. Neumoegen.

PLUSIA ACCURATA. n. sp.

Primaries with the ground color, pale fawn, with a large chestnut-brown blotch in the disc of the wing, and another on the posterior margin, giving it a mottled appearance. Basal half-line and t. a. line both well marked, and shaded inwardly with chestnut-brown. The t. p. line is slightly bent on the costa, then oblique to internal margin. Reniform and sub-reniform united, and forming a bent whitish band reaching to costa, and enclosing a bright chestnut-brown triangular blotch. Below the reniform is a large chestnut blotch, shading into fawn color on the internal margin, and immediately behind the reniform is a pale shade interrupted by the t. p. line. The sub-marginal line is distinct at the apex for about 3 m. m., then lost in a bright chestnut-brown cloud, reappearing in a dentated form near the internal angle. Marginal space chestnut-brown. Secondaries whitish, shaded with pale brown. Fringe white. Lower side of primaries pale fawn color, with the t. p. and sub-marginal lines faintly indicated. Secondaries wholly dull white, with a brownish tinge. Thorax and abdomen concolorous above and below.

Exp. wings, 33 m. m.

1 ♀. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

The absence of thoracic and abdominal tufts may place this species in another genus than *Plusia*, but as its nearest generic ally is unknown to me, I describe it provisionally here. In its system of coloration it reminds us somewhat of *P. consona* of Europe.

LYGRANTHOECIA CONSTRICTA. n. sp.

Dark brown on primaries. On costa and internal margin a distinct white double line, enclosing a space, so constricted and interrupted in the middle of the wing, as to form a double triangle, the bases of which rest on the costa and internal margin. The spaces enclosed by these lines are rather paler than the general color. Posterior margins broadly brownish grey. Secondaries dusky with paler central shade, and dark discal spot. Beneath, wholly dusky, with paler shades, and discal spots distinctly dark brown.

Exp. wings, 28 m. m. Length of body, 14 m. m.

1 ♂ N. Carolina. (H. K. Morrison.) Coll. B. Neumoegen.

ACOPA INCANA. n. sp.

Ground color cream white, the primaries covered with brownish atoms, giving the surface a hoary appearance. There is in one example a whitish streak along internal margin, and again near the costa, but in another, these disappear, and the whole surface is powdered with brown scales. At the end of the cell is a cuneate brown mark, and the margins are also deep brown, with the fringes white. The secondaries are pale dusky, with whitish central shades, and a faint sublunate discal mark. Beneath the wings are wholly sordid white, with dusky shades, and faint discal marks.

2 ♀ Arizona. (I. Doll.) Coll. B. Neumoegen.

Exp. wings, 30 m. m. Length of body, 12 m. m.

EUBOLINA MESKEI. n. sp.

Rich bluish brown, the primaries with numbers of small bluish scales scattered over the surface; the lines all strongly marked and deeply dentated outwardly, the t. p. enclosing a large whitish discal subovate patch, covering the reniform and subreniform spaces. The apical angle bears a bluish iridescent eye-like mark, enclosed by a sinuate white line. There are also some white triangular marks along the apical portion of the costa. Secondaries ochreous brown, with darker sub-marginal waved bands. A paler streak beyond the margin, and the fringe pale. Thorax concolorous with the primaries, abdomen concolorous with the secondaries. Beneath ochreous, with brown waved lines, the margins darker brown. An ochreous crescent near apex of primaries and some small ochreous patches along the costa. The t. p. line is distinct, bent outwardly at the middle. The reniform shows as a brown cloud. The lines on secondaries are double, and in two series across the middle of the wing. The margins are broadly clouded with brown, and there is an ochreous streak on the apex, narrowing towards the centre of the wing. Abdomen and thorax wholly ochreous.

Exp. wings, 32 m. m. Length of body, 18 m. m.

1 ♂ Texas. Coll. O. Meske, to whom I regardfully dedicate the species.

This curious insect, in the ornamentation of the lower side, reminds us of the Australian genus *Praxis*. *Guen*. *Sp*. *Genrl*. *Noctuelites*. *Pl*. 18, *fig*. 10.

SYNEDOIDA CERVINA. n. sp.

Primaries fawn color, with a darker, slightly dentated median line, and a second line on the costa, ceasing at the median nervule. There are indications of a faint discal mark in the cell, and some scattered brown scales, along the costal margin and at the base of the wing. The posterior margin has eight black points, and the fringe is brown and fawn color alternately. Secondaries fawn-drab, paler than the primaries, darkest on the outer margin Thorax and abdomen concolorous above and below.

Exp. wings, 37 m. m.

1 ♀. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

I am inclined to think that this species and *S. inepta*, Hy. Edw., may form the types of a new genus. They are aberrant in their system of coloration, and the thorax and abdomen are stouter and heavier than in *S. scrupulosa* and allies.

FAM. DELTOIDÆ.

ANTIBLEMMA GUTTULA. n. sp.

A singular species, darker in color than *A. canalis*, the general shade being a dull chocolate brown. The lines are indistinct, except the t. p. line, which is common to both wings, and is slightly paler than the ground color, oblique, and near the apex, bent in a very acute angle to the costa. The base of the primaries is mottled with black. The reniform is very large and conspicuous, bluish-white, with a black ring. Behind the acute angle of the t. p. line is a row of small black spots, edged with bluish-white scales, becoming obsolete below the middle of the wing. This broken maculate line appears also on the secondaries. The apex of the costa bears four small pinkish-orange patches, not visible without a lens. The marginal line on both wings is slightly sinuate, cupreous, edged anteriorly with black. Fringes coppery-brown. Discal spot of secondaries jet black. Lower surface has the markings repeated more forcibly. The costal margin is coppery throughout its length, and the discal spot of the secondaries is edged with bluish-white scales. The ground color is a little paler, and mottled with black scales, while the line on both wings is more distinct and deeply dentate throughout its length.

Exp. wings, 30 m. m.

1 ♂. Georgia. Coll. Hy. Edwards.

FAM. GEOMETRIDÆ.

AZELINA ALBOMACULARIA. n. sp.

The smallest species of the genus yet known to me. The space in front of the t. p. line is brownish-fawn color, thickly sprinkled with black atoms; the posterior marginal space, dull cream color, with fewer black scales. T. a. line not reaching the costa, black, shaded inwardly with white; t. p. line also black, double on its internal half, and shaded outwardly with white, the space between, especially on the internal margin, darker than the rest of the wing. Discal spot large, conspicuous, clear white. Some small black crescents are on the extreme margin. Fringe pale fawn color. Secondaries dull cream color, with a double black, slightly dentate line at the anal angle, below which are three small black crescents. Wings slightly speckled with black scales, more especially along the abdominal margin. Thorax bright fawn color, abdomen darker, both thickly speckled with black. Beneath, the wings are wholly pale fawn color, a discal spot and waved line on secondaries blackish, both wings thickly speckled with black.

Exp. wings, 26 m. m.

2 ♂. Arizona. (H. K. Morrison). Coll. B. Neumoegen.

AZELINA ARIZONARIA. n. sp.

Ground color greyish-white, differing in this respect from any form known to me. The lines, which are brown, are almost straight, the t. a. being only slightly dentate near the internal margin. The t. p. line is slightly serrate on its outer edge. The space between these lines, as well as the basal portion of the wing, is covered with brownish irrorations, and there is a brownish cloud nearest to the internal angle. A whitish discal spot and a pale dash along the median vein. Posterior portion of the wing pale grey, fringe brownish. Margins only slightly serrate, the deepest tooth being at the termination of the median vein. Secondaries with brownish, slightly waved, double band, terminating at the anal angle in a brownish cloud. Dentation of the margins deeper than in the primaries. Beneath wholly griseous, with brown irrorations, the bands and discal spot of secondaries darker. Abdomen and thorax concolorous above and below.

Exp. wings, 34 m. m. Length of body, 15 m. m.

1 ♀. Arizona. (I. Doll). Coll. B. Neumoegen.

NEW ARIZONIAN AND TEXAN MOTHS.

By A. R. Grote, A. M.

EUCHÆTES ZONALIS. n. s.

♀. Size large; wings very dark lead color; primaries with the costa dark yellow; internal margin not striped; both wings concolorous, the narrow fringes pale, whitish. Abdomen banded with black and crimson, the latter broadest. Anal hairs whitish. Front dark; head reddish behind; thorax with lateral stripes of yellow in front; disc and tegulæ dark lead-color, immaculate. Beneath dark lead color; legs and body dark; fringes white, contrasting, as does the white anal tuft; costa dark yellow as above.

Arizona. Coll. B. Neumoegen.

EUCHÆTES VIVIDA. n. s.

♂ ♀. Fore wings pale stone color, smooth, thinly scaled; costa and internal margin faintly striped with yellow; hind wings whitish. Abdomen crimson, unspotted; beneath pale gray; fore legs reddish at base. Tegulæ narrowly edged with crimson; thorax pale gray.

South Western Texas. Coll. B. Neumoegen.

Expanse 33 mil.

EUCHÆTES PERLEVIS. n. s.

♀. Size small. Fore wings dark fuscous; the hind wings have a crimson patch on internal margin. Abdomen crimson. Beneath lead color, the patch on hind wings repeated. Veins marked. Wings thinly scaled. Abdomen unspotted; beneath lead color; thorax head and legs lead color.

Expanse 25 mil.

Arizona. Coll. B. Neumoegen.

HYPOPTA HENRICI. n. s.

♂ ♀. Size of *Bertholdi*, but with the wings much broken up by white. The male, with feathered white-stemmed antennæ, is smallest and palest of the two sexes. Costa broadly striped with silvery white; with fine dark preapical costal dots. The ground is brownish fuscous with an ochery shading; hind wings dark fuscous in female, pale in male, concolorous. On fore wing the median vein is striped with silvery white; a terminal series of white block-shaped marks; vein 1 and internal margin irregularly white; fringes pale. Beneath, markings lost; fringes white, contrasting. Named for Mr. H. Edwards.

Arizona. Coll. B. Neumoegen.

TARACHE EXPOLITA. n. s.

Fore wings with the costal field, above median vein, white, traversed by the faint double yellowish lines in place of median shade and t. p. line. Anal angle and fringe again forming a white blotch, with the terminal line marked with pale yellow. Else the wing is blackish, scintillant; at the upper edge it shows, about the middle of the wing, an olive stain. Shorter-winged than *T. angustipennis;* the hind wings stained with fuscous. Head and collar white, thorax black.

Arizona. Coll. B. Neumoegen.

NEUMOEGENIA. n. g.

Form slender; vestiture scaly; clypeus rough, with a superior arched ridge, infra-clypeal plate prominent; wings very wide, entire; apex determinate; external margin regularly rounded; labial palpi short; Legs slender and apparently unarmed; abdomen hardly exceeding secondaries, untufted. Allied apparently to *Acopa.*

NEUMOEGENIA POETICA. n. s.

White. Fringes white. A bright gold patch fills the rest of the primary interrupted by a white patch at extremity of median vein, and stretching along nervules. This golden field leaves the internal margin narrowly white; at base the field is edged outwardly obliquely by a dark reddish line. Hind wings pale smoky. Body white; thorax smoky behind. Beneath immaculate, pale smoky.

Expanse 25 mil.

Arizona. Coll. B. Neumoegen.

EUSTROTIA PROPERA. n. s.

Size very small. Looks like a *Grapholitha;* fore wings blackish to the t. p. line; beyond reddish or carneous gray like the pale tint in *Apicosa.* Reniform whitish. T. p. line black with a rather prominent exsertion, opposite the cell; the line is even. Hind wings pale fuscous.

Expanse 15 mil.

Arizona. Coll. B. Neumoegen.

FENARIA. n. genus.

Form like *Chrysauge.* Eyes naked; clypeus with an embossed protrusion; labial palpi fringed; third article small; tongue stout. Body linear; abdomen tufted at base. Fore wings rounded externally, with rounded apices. Wings full and wide; primaries with noctuiform markings; hind wings yellow, with black border.

FENARIA SEVORSA. n. s.

Fore wings ferruginous brown with a white shade beyond the cell, and a nebulous band behind t. p. line. Both stigmata paler than wing, upright, subequal, ferruginous ringed. Subterminal line dark, waved, regular and prominent; terminal field narrow, hoary. Fringes dark ferruginous. Ground color of primaries blackish, overshaded with ferruginous. Hind wings dark yellow, with an even black marginal band; fringes black. Beneath black, with a yellow oblique subterminal patch; base yellow;

hind wings as above; the yellow is paler. Body and legs blackish.

Expanse 35 mil.

Arizona. Coll. B. Neumoegen.

I regret that I cannot describe the neuration of this unique; it is one of the highest forms of the sub-family *Pyralididæ*.

SOME NEW BEAUTIES FROM VARIOUS PARTS OF ARIZONA.

BY B. NEUMOEGEN.

EUHALESIDOTA PURA. n. sp.

♂. Dark luteous. Antennæ, head, collar, thorax, primaries and abdomen concolorous. Antennæ pectinated. A small, dark-brown discal spot. Another small dark-brown spot between third median and submedian nervules, near conjunction of the two. Slight indications of brownish speckles. Interior margin dark-brownish. Secondaries creamish white, with yellowish basal tuft and brownish fringe of exterior margin. Beneath, primaries luteous, but the space between median nervules and interior margin, as well as the secondaries, creamish white, diaphanous.

Expanse, 1⅝ inches.

Length of body, ⅜ inch.

♀ resembles the ♂, but the discal spot and brownish speckles on primaries more pronounced. Indications of two parallel, transverse brownish lines from costa, near apex, to near the inner angle of interior margin. Antennæ slightly serrated.

Expanse, 1¾ inches. Length of body, ⅜–½ inch.

Southeastern Arizona. Types Coll., B. Neumoegen.

This insect somewhat resembles H. *insularis*, H.-Sch. (which, by the way, is a *Euhalesidota*) of Cuba, but can be at once distinguished from the same by the dark luteous color of primaries.

HALESIDOTA MIXTA. n. sp.

♀. Antennæ, head, collar, patagiæ and body ochraceous. Antennæ slightly serrated. Primaries ochraceous, with dark brownish speckles in the shape of irregular rings. Some of these speckles forming nearly two parallel transverse lines from costa, near apex, down to interior margin. The speckles of anterior line having an irregular triangular shape, whilst those of the anterior line are irregularly reniform. All the nervules are darkish brown.

Secondaries creamish white, with ochraceous basal tuft and diaphanous.

Beneath, primaries and secondaries creamish white. The markings of speckles on primaries partly reproduced. Secondaries diaphanous.

Expanse, 1⅞ inches. Length of body, ⅝ inch.

Southeastern Arizona. Type Coll., B. Neumoegen.

ICHTHYURA INORNATA, n. sp.

♂. Antennæ brownish. Head, thorax and body gray. Primaries gray. A suffusion of brown near costa, fading towards median and discal nervures, leaving spaces of disc, interior margin and base in gray. Three irregular, undulating, transverse lines from costa to interior margin, the space between anterior and middle line being largest, and between middle and interior lines, near base, smallest. The interior and middle lines nearly parallel. A separate line, starting from median nervure, where the middle line intercepts it, running diagonally towards and connecting with anterior line, near interior margin, thus forming a brownish space between costa and interior margin, much in the shape of the Latin letter V. The space at the point of conjunction of anterior and separate diagonal line on interior margin, blackish-brown. The discal spot in upper middle of the V, pronounced and blackish-brown. All the transverse lines and diagonal line, whitish with brown margins; the white accentuation of anterior line near costa especially pronounced. An irregular, transverse row of brown dots in space between anterior transverse line and exterior margin.

Secondaries gray, somewhat fading towards exterior margin. Indication of a transverse whitish line in the middle of anterior down to inner margins.

Beneath, primaries brownish-gray. Indication of the transverse lines, that of the anterior line plainly marked. Secondaries gray, with indication of transverse line.

The ♀ resembles the ♂, only that the transverse row of brown dots is darker and the dots more diffused, sometimes forming streaks and connecting with anterior line.

Expanse, 1⅜ inch. Length of body, ⅝ inch.

Southeastern Arizona. Types Coll., B. Neumoegen.

I have called this beautiful insect *inornata*, as it is readily distinguished from its relatives by its plain, unornamented thorax.

CNETHOCAMPA GRISEA. n. sp.

♀ Antennæ, head and primaries dark blackish-gray. Thorax pilose and dark gray. Antennæ serrate. Diffused markings in blackish on primaries. Three transverse, irregular undulating lines, of whitish-gray color, from costa to interior margin, the interior line near base most pronounced. The margins of transverse lines blackish-gray. Body dark gray.

Secondaries uniform dark gray with pronounced marginal fringes.

Beneath primaries and secondaries uniform dark gray.

Expanse, 1 inch; length of body, ¼ inch. Type Coll. B. Neumoegen.

The first representative, discovered in our country, of this well-known European genus.

San Francisco Mountains, Northern Arizona.

Marmopteryx Seiferti. n. sp.

Head, thorax, body and primaries dark ochraceous, somewhat fading towards base of primaries. Marginal fringes brownish. A triangularly-shaped coffee-colored blotch, covering the space of apex and continuing as a small band along exterior margin, gradually diminishing at the junction of inner angle. A large, coffee-colored diagonal discal blotch, shaped like an irregular square, and running from costa to 2d median nervure. At base of costa a small, coffee-colored streak.

Secondaries uniform ochraceous, fading towards base, fringes brownish.

Beneath primaries ochraceous, the apical blotch and marginal band richly dressed with brown grains. Discal blotch suffused, blackish, covering space between discal nervures and base, and fading towards the latter.

Secondaries light ochraceous, richly dressed with innumerable brown grains.

♂ ♀. Prescott, Arizona. Types Coll. B. Neumoegen. Expanse, 1½ inch. Length of body, ⅜ inch.

I take great pleasure in naming this handsome geometrid after my good friend and ardent entomologist, Mr. Otto Seifert.

Stiria Sulphurea. n. sp.

Head, collar and primaries of bright sulphur color. Patagiæ covered with brownish dust. Fringes brownish, connected with an irregular, oval shaped, brownish blotch, resting on middle of exterior margin. A dark brown, small reniform spot on the middle of interior margin. A small brown streak at base. A faint brownish transverse undulating line from costa to junction of reniform spot on interior margin. The space included in this line covered with a few brownish dots.

Secondaries uniform grayish-brown with lighter fringes.

Beneath, primaries blackish-brown, fading into grayish-yellow near apex and exterior margin.

Secondaries uniform grayish-yellow.

♂ ♀. Expanse, 1¼ inch. Length of body, ¼ inch.

Prescott, Arizona. (I. Doll.) Coll. B. Neumoegen.

NOTE.—The above descriptions were issued in the form of an "extra," on October 7th, 1882.

DESCRIPTIONS OF NEW SPECIES OF DIURNAL LEPIDOPTERA TAKEN BY MR. H. K. MORRISON, AT FORT GRANT AND IN GRAHAM MOUNTAINS, ARIZONA, 1882.

BY WM. H. EDWARDS.

MELITÆA PERSE.

Male.—Expands 1.1 inch. Shape of M. *Dymas*, Edw. Upper side yellow-fulvous with black lines; both hind margins broadly bordered black, on which are sub-marginal fulvous spots, small and irregular in shape on primaries, sub-crescent on secondaries; anterior to these a common series of sub-quadrate spots, and another similar, elongated, the two separated by a black line on primaries and partially on secondaries; thence to bases of wings fulvous with black reticulations; fringes black, white at tips of the nervules.

Under side of primaries fulvous, the black markings repeated indistinctly; costal edge white, along hind margin a narrow buff belt, and next a series of yellow-white crescent spots. Secondaries have a similar edging to margin, and a series of large yellow-white crescents, next anterior to which is a series of spots, sometimes small and rounded, orange, on a whitish ground, sometimes wholly orange; above these a narrow buff belt, a black line and a white band, bisected with black next costal margin; thence to base orange, with a white spot edged black in cell, a cross band of four white spots, an orange band, a white band on shoulder, the tip of the shoulder buff.

Body above fuscous, the abdomen on sides fulvous, beneath both abdomen and thorax yellow-white; legs fulvous, the femora white on under side; palpi fulvous, white at base; antennæ black annulated white; club black, ferruginous at tip, white beneath.

Female.—Expands 1.3 inch. Similar to the male, the fulvous more diffused. Under side as in the male.

From 3♂ 3♀. This species belongs to the same sub-group with M. *Dymas*, Edw., the fore wings being elongated and narnow. *Dymas* was described from San Antonio, Texas.

LEMONIAS ARES.

Male.—Expands 1.3 inch. Upper side of primaries brown, with a very faint reddish tinge beyond disk to margins; of secondaries fulvous over costal half of the wing, the remainder, to inner margin, brown; primaries have an obsolescent marginal and extra-discal row of dark points; a demi-row of black spots from costa to second branch of median, at end of cell; a row of similar spots a little nearer base quite across the wing, and three indistinct transverse rows from middle of cell to base. Secondaries have a sub-marginal row of black points, an extra-discal row of small spots, a demi-row on disk, and others nearer base; fringes of primaries brown, a little white in the median interspaces; of secondaries white, cut with brown at the ends of the nervules.

Under side ferruginous, the apical and costal area of primaries, and all of secondaries, dusted with whitish scales, giving a gray surface; rest of primaries fulvous; the black spots on the fulvous area repeated, but elsewhere either indistinct or wanting: on secondaries a row of fine points crosses the disk, but faint; the black spots not repeated.

Female.—Expands 1.6 inch. Upper side as in male, the two outer rows of spots on primaries distinct, the marginal being rounded, and with a little fulvous on the outer side of each. On the under side there is less gray, and the spots of both wings are repeated, reduced.

From 2♂ 1♀.

LEMONIAS CLEIS.

Male.—Expands 1.6 inch. Upper side yellow or dead-leaf-brown; primaries have a sub-marginal row of indistinct dark points; an extra-discal row of crescent black spots; a demi-row at end of cell, forming a crenated line, on the basal side of which the ground is suffused with black; three rows between middle of cell and base. Secondaries fulvous, over brown ground on inner half the wing; near hind margin a row of small rounded black spots, an extra-discal row of crenated black spots, a zigzag row of crenated spots across disk, and other rows to base, much as in primaries; fringes dusky, with a little white in the median interspaces and near apex; of secondaries whitish, with brown at the ends of the nervules.

Under side pale ferruginous, the spots indistinctly repeated in faint brown marks and points, except in inner margin of primaries, where they are black.

Female.—Same size. Upper side nearly as in the male, the black area on costa of primaries more conspicuous. Under side as in the male.

From 1♂ 1♀.

These two species *Ares* and *Cleis* belong to a group hitherto unrepresented in our fauna, the fore wings being long and pointed, more triangular in shape than the *Mormo* group.

THECLA APAMA.

Male.—Expands abcut 1.1 inch. Allied to *Dumetorum* Bd. but marked on under side like *Castalis* Edw.; tailless.

Upper side blackish-brown: primaries have an oval black stigma; fringes ashy-brown, near anal angle white next the margin, the tip of the hairs brown, at the angle black.

Under side of primaries yellow-brown, washed with golden green over apical area and on costal margin; on the disk a transverse row of small spots confluent from costa to second median interspace: these spots are made up of slender black marks, edged outside by white, inside by brown or russet. Secondaries have a discal row of similar but separated spots, those on costal half of wing crescent, the others serrated, the row somewhat irregular; at anal angle the margin is edged white over the black fringe.

Female.—Same size; the disks russet.

Several examples of this species were received. I had it formerly also from the Wheeler Expedition.

PAMPHILA DEVA. *Edw.* Trans. Am. Ent. Soc. V. 292, 1876.

Male.—Expands 1.4 to 1.8 inch. Upper side dark brown, with a bronze reflection; primaries have three small semi-translucent white spots on costa near apex, a large rhomboidal spot at end of cell, with an angular sinus on either side, a small spot at origin of upper median interspace, and a large sub-rectangular spot in second median interspace—these, with the cellular spot, making a triangle; secondaries immaculate; fringes of primaries brownish-cinereous, lightest next inner angle; of secondaries, whitish throughout.

Under side brown; the apex, costal margin of primaries and all of secondaries dusted with gray scales; the spots repeated; in addition, secondaries have a brown dash on middle of disk, transverse, and within this a white streak.

The foregoing description is taken from one male, another has the spots all small; on under side of secondaries the brown dash is without the white streak.

Female.—Expands about 2 inches. Same color and markings as the male on both sides; the black dash is present, but the white streak is wanting in all the examples under view.

From 2♂ 4♀.

Deva was originally described from a single female received from the Wheeler Expedition 1875 or 1876, and up to the present time this and another female taken by Mr. Neumoegen, in 1880, have been the only representatives of the species known to me in collections.

PAMPHILA PITTACUS.

Male.—Expands 1.5 inch. Upper side pale brown, thickly dusted with greenish-gray scales over whole surface; both wings have semi-transparent spots; on primaries three sub-apical on costa, three in oblique line across the median interspaces; a large spot at end of cell, rhomboidal or rectangular, constricted across the middle. Secondaries have a straight transverse row on middle of disk, four spots nearly confluent; fringes cinereous.

Under side brown; apex and costa of primaries and all of secondaries hoary with whitish scales; the spots repeated; a whitish point near outer angle of secondaries, another near base in same interspace, and a third in sub-median interspace near base. These all obscure.

Female.—Same size. Upper side similar to the male; on secondaries in the example under view the band on secondaries is wanting, except the outermost spot; and on the under side there is the same difference.

From 3 ♂ 1 ♀.

PAMPHILA PYTHON.

Female.—Expands 1.6 inch. Upper side brown, thickly dusted with yellow-fulvous scales; primaries have three small sub-apical spots on costa, a sub-rhomboidal spot at end of cell, and three spots in oblique line; all yellowish, semi-translucent. Secondaries have two small yellow spots near outer angle, perpendicular to the margin; fringes of primaries white, with brown at the ends of the nervules, of secondaries white.

Under side brown; secondaries covered with gray scales, and primaries on apical area; the spots of primaries repeated; secondaries have two small white patches in sub-costal interspace, one near origin, the other at outer angle, and a bent row of five small white spots on the disk; there is also a small patch at origin of sub-median interspace. From 1 ♀.

PAMPHILA NEREUS. *Edw.* ♂. Trans. A. E. Soc. 5, 207, 1876.

This species was described from a single male received from the Wheeler Expedition, and taken in South Apache, Arizona.

Mr. Morrison sends me several fine examples. As there is some variation from the description, and the present examples are in perfect condition, while the insects collected by the Wheeler Expedition never were in such condition, I reprint an amended description.

Male.—Expands about 1.1 inch. Upper side dark brown with a greenish gloss; primaries have a transverse band of small white spots, four of them on costal margin, in a line slightly concave outwards; the others form an oblique line with these to middle of inner margin; in some examples the band is broken by the absence of the spot opposite cell; fringes long, cinereous.

Under side of primaries dark brown on disk to inner margin and base; the apical area half way down hind margin, and the costal margin thickly dusted with gray-yellow scales; the spots repeated. Secondaries entirely covered with gray-yellow; a little beyond the disk an irregular row of small indistinct whitish spots nearly parallel to hind margin, and curving around outer angle and along costal margin; a spot in cell.

Female.—Same size. Upper side dark brown, the spots less conspicuous than in the male. Under side as in the male.

PHOLISORA ALPHEUS. *Edw.* Trans. A. E. Soc. 5, 186, 1876.

This species was described from two males taken in New Mexico in 1875, and the presence of fresh examples causes me to amend the description.

Male.—Expands from 1.1 to 1.2 inches. Upper side of primaries gray-brown, of secondaries black brown; primaries have a series of black dashes in the interspaces beyond the disk from costa to inner margin, and a second transverse row of indistinct black patches nearer base; along hind margin are rounded blackish spots, not well defined; on costal margin two or three sub-apical white dots, and another in lower median interspace, not always present; fringes of primaries brown with a few white hairs at the ends of the nervules; at the apex a clear white space; of secondaries wholly brown.

Under side dark brown, the apex and hind margin of primaries and all of secondaries dusted with white scales; the spots repeated. Secondaries have an indistinct sub-marginal row of small whitish patches, two or three similar patches across the disk, and one in cell; but in some examples all these marks are nearly or quite wanting.

Female.—Same size. In general like the male, but at the outer ends of the black dashes on primaries are whitish scales, and on secondaries is an extra discal series of whitish patches, small, and sometimes composed of a few scales only. On the under side both wings have a sub-marginal series of whitish points; under the sub-apical white spots, is a white dot in each of the median interspaces, and a white streak across end of cell on secondaries.

From 4♂ 2♀.

PHOLISORA CEOS.

Male.—Expands 1.15 inch. Upper side black-brown, with a few scattered whitish scales, an indistinct band, scarcely differing from the ground, along hind margin of primaries, and a similar one sub-marginal; two white dots on costa near apex; fringes concolored. Under side nearly same shade as above, the white dots sometimes repeated, sometimes not; near anal angle of secondaries two gray dots across sub-median interspace. Body black-brown above; abdomen black beneath; thorax white; palpi white, on upper side ferruginous, and the hairs between the eyes and on back of head and front of thorax, all ferruginous; antennæ black; club black, gray beneath.

Female.—Same size. Precisely like the male, except that there are three white dots on primaries instead of two in the examples under view.

From 2 ♂ ♀. This species is readily distinguished by the ferruginous covering to head and front of thorax.

EUDAMUS DORUS.

Secondaries much produced at anal angle.

Male.—Expands 1.6 inch. Upper side dark brown, with many whitish semi-transparent spots; primaries have three small sub-apical spots on costa, a dot just below these, towards hind margin; three large spots in the median and sub-median interspaces, in a line parallel to hind margin; a small spot near middle of costa, a large patch under this, in cell, and a large sub-rectangular spot at origin of lower median interspace; secondaries clothed with long, dark-gray hairs, across disk a line of four whitish spots;

fringes of primaries dark cinereous, alternating with brown; of secondaries light cinereous, but next anal angle brown.

Under side brown, the inner margin of primaries yellowish; the spots repeated, enlarged, and more or less confluent on primaries. On secondaries the spots are much dusted with brown scales; both wings much covered with whitish or bluish-white scales, especially dense on apical area of primaries and over outer limb of secondaries, but nearly as dense at base of these last; secondaries have two blackish transverse narrow bands, the outer one in line with the spots, the other half way from this to base, and the two are connected by a broad ligament of same color on under side of cell; near base three small brown patches.

Body above brown, underneath gray-brown; legs brown, annulated white; palpi white with many gray hairs on upper part; antennæ black, annulated on under side with white; club deep ferruginous, white on under side.

Female.—Expands 1.7 inch. Like the male; the spots rather larger.

From 2♂ 2♀.

EUDAMUS EPIGENA. *Butler.* Trans. Ent. Soc. Lond. 4, 493, 1870, Id. Lep. Exot., p. 65, pl. 25, fig. 6.

Male.—Expands about two inches. Upper side blackish-brown, marked by nine small semi-transparent spots; of these three are sub-apical on costa; three form an oblique line, to which a fourth is at right angles, in sub-median interspace; two on middle of costal margin; fringes of primaries white at inner angle; dusky-white to apex, with brown at the tips of the nervules; of secondaries white, with a few short brown hairs at tips of the nervules.

Under side of primaries brown, dusted with white narrowly along hind margins; the spots repeated; secondaries dark brown, crossed by two black bands, of irregular outlines; the hind margin broadly bordered white, on which are brown reticulations.

Female.—Expands about 2.1 inch. Similar to the male. In one example under view several of the spots are wanting.

From 3♂ 3♀.

I re-describe this species, as it is described and figured in works not accessible to most American lepidopterists. I formerly received a female of *Epigena* from Texas, through kindness of Mr. Otto Meske, and it has remained an unique in my collection till now.

EUDAMUS MOSCHUS.

Male.—Expands from 1.3 to 1.7 inch. Upper side very like *Hippalus. Edw.* (PAPILIO, 2, 27). Glossy brown, with nine whitish, semi-transparent spots on primaries, of which four are sub-apical on costa, three across discoidal and median interspaces, in an oblique line, one in cell and another above this; these spots are all small, and those in cell and lower median interspace are much smaller than in *Hippalus;* fringes of primaries whity-brown, darker at the ends of the nervules; of secondaries white, except at outer angle; there as in primaries.

Under side of both wings brown, mottled with dashes about apex of primaries, and crossed by two black bands, and a demi-band on secondaries; in some examples the disk and base of secondaries is nearly as dark as the bands, and the margin is gray, but usually the contrast is decided between the ground and bands; the spots of primaries repeated.

Body above dark brown, beneath thorax gray-brown; abdomen same (in some cases light, with a dark ventral line); legs yellow-brown; palpi yellowish, with brown hairs; antennæ black above, luteous beneath; club black above, yellow beneath; the tip ferruginous.

, Female.—Expands about 2 inches. Similar to the male.

From 6♂ 6♀.

PYRRHOPYGA ARAXES. *Hewitson.* Descr. Hesp. 2, No. 3, 1867.

Male.—Expands about 2.1 inches. Upper side brown, dark along both hind margins; primaries have ten semi-translucent yellow spots; of these 3 form a curved row on costa near apex, and a 4th is near these on basal side; 3 make a band on the discoidal and upper median interspaces, and 3 on end of cell and interspaces below; secondaries immaculate; fringes alternately black and white.

Under side of both wings yellow-ochre, except on outer half of primaries and along the hind margin of secondaries; the spots repeated.

Body above brown, the rings of abdomen on sides, and the entire under parts yellow ferruginous; legs and palpi same; antennæ black. The club brown on upper side. The rest ferruginous.

Female.—Expands 2.3 inches. Similar to the male in all respects.

From several ♂ ♀. I formerly received examples of this species from the Wheeler Expedition, but it has been very rare in collections of North American butterflies. It flies through Mexico and South. The yellow under surface is a distinguishing character.

AMBLYSCIRTES NANNO.

Female.—Expands 1.3 inch. Upper side brown, thickly dusted with fulvous scales over whole surface; primaries have three small white sub-apical spots on costa and an oblique line of four small spots, the outermost opposite cell near hind margin, or a little beyond disk; on secondaries an obscure transverse row of small yellowish spots; fringes of primaries alternately white and brown, of secondaries white.

Under side of both wings dark brown, a little dull fulvous on cell and disk of primaries; the surfaces, especially of secondaries, much dusted with white; the spots of primaries repeated, and in addition a spot in cell; secondaries have a curved row passing from near base on costal margin entirely around both margins, ending at sub-median nervule; eight spots in all, small white, also a spot in cell.

From 1 ♀.

ON THE PTEROGOSTIC AND OTHER CHARACTERS OF EUCATERVA.

By A. R. Grote.

The male antennæ of *Eucaterva Variaria* are bipectinate, the long ciliated branches diminishing in length gradually to the tips. The stem is mostly covered on the outside by white scales, and the branches also are tipped with white scales. The simple female antennæ are nearly all black; they show an interspersing of white scales, especially towards the base. The male labial palpi are curved, stretched forward beyond the front, marked with black and white scales; the long second joint is twice banded with black and white, the third article is tipped with white, the black base corresponding with the black spots on the second article. The female palpi are shorter, projected more straightly forwards. The terminal article is tipped with black. What is singular is that in the individual, which I am disposed to believe is the typical ♀, the palpi appear really shorter than in the specimen which I regard as the variety. The eyes are naked, ocelli wanting, the clypeus broad and rather full. The tongue is apparently rudimentary, as in three specimens which I have carefully examined I find no appearance of it. I have not broken off the palpi, however, which may conceal it.

I regard as the typical female the form in which the middle of the primary is taken up by a deep black opaque shading, leaving the costa and internal margin white.

The variety wants this black broad stripe and is immaculate white, black dotted, and reminding us of *Catenaria*. This variety I call LABESARIA.

The abdomen, especially in the female, is somewhat clumsy and vermiform. The scales are rather thinly laid on. The white wings of the variety *Labesaria* are somewhat transparent. In the male the front wings are thickly powdered with black over the centre, and this black shading takes on vaguely the shape of the black portion of the wing in the typical female. But the most obvious difference between the sexes is the absence of the two median lines of the male primaries above, in the two female forms.

The examination of the entire forewings of the female typical form shows that the tegument extends much beyond the costal vein at the shoulder of the wing; the costa is a little depressed at the middle. The cell is closed; vein nine, a short furcation out of eight. On the secondaries the cell is also closed and divided centrally by a vein. There is a long, narrow auxiliary cell in the forewings, from the apex of which ten is thrown off to costa, and a little beyond this, towards the base of the wing, vein eleven is thrown off from its upper edge to costa. A second smaller cell is formed above the sub-costal vein, stretching to base of wing, by a cross-vein from vein twelve. The neuration is not very different from *Dasyfidonia*, and assists our classification of this interesting moth among the *Fidoninæ*. The moth is always remarkable from the unusually long, cylindrical, closely scaled labial palpi, no less than for what seems an instance of dimorphism in the female sex.

SOME ADDITIONAL NOTES ON ADELOCEPHALA BICOLOR. *HARRIS.* WITH DESCRIPTION OF A NEW VARIETY.

By H. S. Jewett, M. D., Dayton, Ohio.

Adelocephala bicolor. *Harris.*

Var. immaculata. n. var.

Size and shape same as *A. bicolor*. Color, ochre yellow. In typical *bicolor* the upper surface of the primaries and lower surface of secondaries are sprinkled with small black dots. *In this variety these dots are entirely wanting.*

The oblique line and discal spot of primaries are marked, more or less strongly, by pale red. The red of the upper surface of secondaries and under surface of primaries is much paler than in the typical insect, and covers only the anterior two-thirds of upper surface of secondaries, the posterior one third being pale ochre-yellow.

Thorax and abdomen are pale ochre-yellow above, inclining to brown beneath.

About one per cent. of each brood are of this variety.

In my description of the larva of *A. bicolor* which appeared in the March number of this journal, I stated that I had never found the "silver horns" on any other segments than the fifth, seventh, ninth and tenth. I have now to add that this year I reared three larvæ having these silver horns on every segment except the twelfth; still, the imagines from these three larvæ did not differ from the ordinary form.

The moths vary very much in color and amount of ornamentation. Thus the ground color varies from pale ochre-yellow through yellow-brown to reddish purple and purple-brown; or the portion of the primaries anterior to the oblique line may be ochre colored, while the portion posterior to that line is some shade of red-brown or purple-brown. Again, the upper surface of the primaries and under surface of secondaries may be entirely free from black dots (as in var. *immaculata*), or these surfaces may be very densely covered with the black dots, with every intergrade between the two extremes. The oblique line across the primaries is generally present, but may be entirely wanting. Finally, the whole of the upper surface of the secondaries is generally red, though the red may be confined to the anterior two-thirds of the wing, as in *immaculata*, with intergrades between the extremes.

OBITUARY.

CHARLES GODREY SIEWERS, of Newport, Ky,, a well known entomologist, and a Cor. Memb. of the N. Y. Entomological Club, died on September 6, 1882. He was a son of the Rev. Henry Frederick Siewers, a missionary of the Moravian Church, and was born on the island of Santa Cruz (or Saint Croix), in the Danish West Indies. At the age of about five years he was sent to Nazareth Hall, a Moravian Academy at Nazareth, in the State of Pennsylvania, for his education, where he remained until the age of fifteen, when he was apprenticed to E. W. Carpenter, a manufacturer of planes, etc., at Lancaster, Pa., to learn the trade. In 1837 he settled in Cincinnati, where he went into the manufacture of saws and other tools. Being very fond of fruit culture, he removed in 1858 from Cincinnati to a farm some four miles south of Newport, Ky., near the Licking River, where he planted a vineyard and fruit trees, to which he devoted all the time he could spare. The grape culture proved unprofitable, and in 1872, his health and strength failing, he retired from active business. He spent much time during his last years in the study of entomology, and contributed articles embracing the results of his investigations to periodicals devoted to his favorite science. In him those who knew him well found a man of culture and refinement, of bright and poetic thought and expression, of genial and cheerful spirits, and of high moral worth.

BOOK NOTICES.

NEW CHECK LIST OF N. AM. MOTHS, AND ILLUSTRATED ESSAY ON THE NOCTUIDÆ. BY AUG. R. GROTE.

Mr. Grote is well known not only in this country, but throughout the world, as one of our hardest-working entomologists, and the labor that he accomplishes, even against the pressure of a poor state of health, is absolutely surprising. His "New Check List" is a model catalogue, and is perhaps the truest evidence to be found of the vast knowledge of its author of the subject upon which he treats. It embraces the whole of the known species of Heterocera published up to August, 1882 (exclusive of the Tineidæ), and includes Prof. Fernald's late catalogue of the Tortricidæ. The following are the number of the species catalogued in each family: Sphingidæ, 91; Ægeriadæ, 111; Thyridæ, 4; Zygænidæ, 57; Bombycidæ, 375; Noctuidæ, 1409; Geometridæ, 403; Pyralidæ, 326; Tortricidæ, 406. In his preface Mr. Grote says: "The present list of names of described species of N. Am. Moths is as correct and complete as I can make it in the present state of our knowledge of the families here included;" and it is not too much to add that the work is by far the most perfect catalogue yet issued from the press wfth reference to American Lepidoptera. It displays in an eminent degree Mr. Grote's knowledge of the groups to which he has devoted most of his attention, and is a volume absolutely indispensable to all who study the Heterocera of this country. To catalogue properly one of the groups alluded to is no mean labor, and we do not hesitate to say that no ten entomologists in the U. S. could, without his aid, have accomplished the work here performed by Mr. Grote alone. The "Check List" contains seventy-three pages, including the preface, and is admirable in its "get up" and general appearance. It is printed and published by the "Spectator Press Company," New York.

The "Illustrated Essay" is a dainty book, in which the author treats his subject in a half-scientific, half-gossipy strain, and thus renders it interesting and instructive to those who do not follow the hard road of technical study. The "Structure and literature" of the Noctuidæ are treated in the first chapter, a second is devoted to "Mr. Walker's types in the B. Museum," a third to "Notes and descriptions of rare N. Am. Noctuidæ," and the work is illustrated by four exquisitely colored plates by the Messrs. Mintern, of London, in which forty-five species are figured. Mr. Grote's chapter on a "Colony of Butterflies," originally published in the *N. Am. Naturalist*, closes the volume, which has been issued by Van Voorst, of London, and is a notable contribution to N. Am. Entomological literature.

NOTES ON LEPIDOPTERA.

FEMORAL TUFTS. It may interest the readers of "PAPILIO" to know that from reading my paper on this subject Dr. Ehrich Haase, an assistant to the Zoological Museum of Breslau, Germany, has undertaken the pathological study of these appendages. He has requested the sending of such species of Catocalæ as I have captured this season, after an examination of which we shall have an opportunity of availing ourselves of the observations of this eminent pathologist. This season I have examined fresh specimens of *Catocala* and find the tufts in the males of all the larger species. I have not been able to detect them in *Catocala grynea*. C, *praeclara*. C, *gracilis* and its varieties.
JAMES S. BAILEY, M. D.

FANS ON THE FEET OF CATOCALINE MOTHS. I have found these fans abundantly displayd on specimens of *Parthenos nubilis* captured by me during the summer, and have also detected them on *Catocala desperata* and *Catocala amatrix*, in all cases only upon the ♂ sex. HY. EDWARDS.

NAPTHALINE CONES. As a defense against destructive insects, I can bear ample testimony to the value of these cones. Last year I suffered greatly from the depredations of the well known small red ant, the bodies of freshly caught Lepidoptera being eaten entirely away, and great damage done to the wings, by the scales being bitten off by these pests. This year, in each of my store boxes, I have placed one of the Naphthaline cones, and though the ants have been as abundant as ever, I have not lost a single insect, out of nearly 3000 specimens. I desire also to say that I do not observe the smallest trace of "grease" arising from the use of the cones. HY. EDWARDS.

CALLARCTIA ORNATA. Packard. I find after careful investigation, that this form, which has long been a puzzle to entomologists, is only one of the innumerable varities of *Arctia achaia*, G. & R. and that it is the same as the No. 1 of my notes on this species, ("PAPILIO," vol. 2. p. 91.) I have a specimen from Butte Co. Cal., which fits the description exactly, even to the median outer spot being divided by the pale median nervules. I believe that at the time Dr. Packard made his description, that of *A. achaia* had not been published. R. H. STRETCH. San Francisco.

LARVÆ OF SPHINGIDÆ. The newly-hatched larvæ of several of the *Sphingidæ* appearing on the *Ampelopsis quinquefolia* and grape, in June and July, are very easily distinguished, even as they emerge from the egg. *Thyreus abbottii* appears earliest, in 1881 about June 1st, in 1882 near the 20th. The larvæ are cylindrical, of a uniform light blue-green with a powdery bloom, body finely striated transversely. Stigmatæ indistinct. Anal horn erect, black, yellow at the base, long and very slender. *Amphion nessus*, from one to two weeks later; is cylindrical except a slight enlargement of the third and fourth segments, increasing at every moult. Body pale yellow-green, with two light, longitudinal, subdorsal lines, straight from the head to the eleventh segment, thence curving to the anal horn, which is short, black, ochrish or red-brown at the base, tapering abruptly, and often carried in a line with the back. *Philampelus achemon*, which should arrive with the close of June, this year comes in July's second week. The larva is cylindrical, of a pale apple-green, with a distinct yellowish line formed by folds of the skin, dividing the segments, and light, perfectly straight subdorsal lines. With this comes *P. pandorus*, the larvæ very similar in early stages. Both species change after two or three moults, to rich dark wine-color, straw-color shading to vandyke brown, or other beautiful colors. A *P. achemon*, bred from the egg, at second moult became a clear, light cherry-color, growing brighter for several days. JULIA E. SANDERS, Davenport, Iowa.

PROBABLE DIFFERENCE IN TWO BROODS OF DRASTERIA ERECHTHEA. Several years ago, while examining specimens of this species, I found that the first brood of the moths captured in New England in May and June were smaller than the August brood. Seven specimens of the spring brood of the ordinary gray tint had fore wings .65 inch in length; the ochreous variety, .67 inch. On the other hand, the average length of the fore wing of the August specimens is .82 inch. If this difference between the two broods is found to be permanent, it might be attributed to the fact that the smaller size of the spring brood is due to the autumnal brood of larvæ feeding in late summer and early autumn on less juicy and nutritious food than the mid-summer caterpillars, the young of the August brood of moths, when larvæ feed on fresh, green clover. It will be remembered that, according to Mr. William Saunders, the food plant of the common moth is the clover. Having received a considerable number of this species from upper California and Oregon, I have found that they are uniformly much larger than Eastern examples. The normal gray form has fore wings .84 inch in length, while those of the ochreous variety measure .95 inch. It thus appears that the Pacific coast specimens are much larger than Atlantic coast examples, and that the same distinctions in size obtain between the common gray and the ochreous form. We have noticed this species in our Monograph of Geometric Moths, p. 587, as an example of the law of increase in size westward and southward of species common to both sides of our continent. (See p. 589). A. S. PACKARD, JR.

PHYCIDÆ OF THE UNITED STATES. Mons. E. L. Ragonot, of Paris, is devoting considerable attention to the study of this difficult group, and invites the co-operation of collectors in this country. M. Ragonot is already assisted by the loan of the collections of Zeller, Staudinger, Snellen, Druce, Moore and Lord Walsingham, and has therefore abundant material on hand for a monograph of this little-known family. I shall be happy to forward specimens to M. Ragonot from any of the subscribers to PAPILIO, due credit being given for the same. HY. EDWARDS.

SPECIES OF PYRALIDÆ OMITTED FROM THE NEW CHECK LIST.—The following names, I find, have been accidentally omitted in the *Pyralidæ*. For their detection I am indebted to my kind friend, Prof. C. H. Fernald, who is good enough to write me: "I have just been through my Pyralids and arranged them according to your 'New List,' which the more I work with the better I like it. You have omitted the names below:

(Page 52.)

FABATANA, Walk.
20½ Oviplagalis, *Walk.*
Anthoecioides, G. & R.
CHYDONOPTERON, Riley.
22½ Tacomæ, *Riley.*

(Page 55.)

AMBESA, Grote.
248½ Laetella, *Grote.*"

A. R. GROTE.

PARNASSIUS THOR. Hy. Edw.—Having recently had an opportunity of examining the ♀ of *P. Eversmanni*. Men. I have no hesitation in referring *P. Thor* to this species, though the size and intensity of the red spots, and the much smaller expanse of wing, perhaps, entitle it to be considered as a variety. The synonomy should stand: *P. Eversmanni*. Men. Siberia. Var. *P. Thor* ♀. Hy. Edw. Alaska. HY. EDWARDS.

A YOUNG LEPIDOPTERIST.—The following note from a young lady, twelve years of age, is deemed worthy of publication: "Dear Mr. Edwards: The moths of *Eugonia alniaria* are now coming out in numbers, the species being common on Staten Island. I thought this might interest the readers of 'PAPILIO.'—Yours affec., ANNA GROTE, Oct. 10."

PAPILIO.

Organ of the New York Entomological Club.

Vol. II.] Nov.-Dec., 1882. [Nos. 9 and 10.

DOUBLE NUMBER.

Note.—It was impossible to issue the November number in proper time, so that the articles which would have composed it are given with the December number, making the same amount of pages.

ON PAPILIO MACHAON L., AND ITS N. AMERICAN REPRESENTATIVES—; PAPILIO RUTULUS. BVD.—; AND PARNASSIUS. BEING PORTION OF A PRELIMINARY REPORT ON THE BUTTERFLIES OF WASHINGTON TERRITORY.

By Dr. H. A. Hagen.

As far as I know all insects, hitherto described, from Washington Territory were collected west of the Cascade Mountains. The larger portion of this Territory east of the Cascade Mountains, north of the Columbia River, to the frontier of Idaho, has never been visited by entomologists, except perhaps the southeastern belt of the Wallula Valley. The climate of the country east of the Cascade Mountains is very different from that west of them, the latter being similar to the climate of California. The country east of the Cascade Mountains consists to a large extent of the basin of the Columbia River, with immense sage-brush deserts, and here falls the least amount of rain through the U. Sts. At right and left mountains, with a rich vegetation of forests and large fertile valleys, ascend to the Cascades, and the Rocky Mountains. It is one of the few parts in the U. Sts. not yet examined by entomologists, and the good chance to collect here was offered by the N. Transcontinental Survey, under the direction of Prof. R. Pumpelly. The collection of butterflies made by *Mr. S. Henshaw* and *Mr. R. H. Stretch* is large, and contains interesting species, which may justify a preliminary report.

The preparation and spreading of the butterflies has only been commenced, so that but imperfect notes can be given, but as the collection of the Cambridge Museum, contains a large number of species, determined by the best authorities, the notes based upon a careful comparison of the Washington Territory species with those in the collection may be acceptable.

The specimens were collected from June 24 to July 27, from Umatilla to Spokane Falls. Some were taken near the Falls and at Umatilla, on the Oregon side of the Columbia River, where Mr. Morrison collected for a few days. After July 27 some were collected in Western Montana. In Washington Territory we crossed the desert opposite Umatilla, and followed the Yakima River and the valleys on the right side to the fork in the Cascade Mountains, returning *via* Ellensburgh, and through the desert to Ainsworth and Spokane.

PAPILIONIDÆ.

P. ZOLICAON AND P. OREGONIUS.

The large number of specimens of both sexes (74) approves the statement that both species *cannot be separated.* Half of them were collected June 24, 25, at Umatilla, on the Oregon side of the Columbia River; the other half in Washington Territory, just opposite Umatilla, June 26. One old and torn specimen July 18, at Lone Tree Camp, near the Yakima River. Some collected at Spokane are in the collection of Mr. Ricksecker. The main part of the specimens belongs to *Pap. oregonius.* The typical *P. Zolicaon* is only represented by half a dozen specimens flying promiscuously with the others.

The true *P. Zolicaon* is to be recognized—I—by the black spot in the anal rufous spot *entirely* isolated above and below; II—by the cell of the primaries on the under side wholly black; III—by the abdomen being black, with only a yellow side stripe; IV—by smaller size (of W. H. Edwards). Concerning the black isolated spot (I.) I find among the Californian specimens in the collection one female with a continuation of the spot on the under side to the black stripe which edges the inner margin. Mr. W. H. Edwards has figured pl. 6 f. 4 *exactly* the same for the female of *P. Zolicaon*, without mentioning it in the description. The specimens from Washington Territory have the spot either isolated or connected below. Some specimens of the true *P. oregonius* possess isolated black spots, sometimes only in one wing. There are before me *all intermediate* forms of a spot entirely isolated, or partly or wholly connected with the black stripe of the edge. Concerning the cell of the primaries (II.) some *P. oregonius* with a connected spot and a yellow abdomen have the cell partly or even *entirely* black as *P. Zolicaon;* on the contrary, some *P. Zolicaon* (with a largely black abdomen) have the cell yellow as *P. oregonius.* The color of the abdomen (III.) is, indeed, largely black in *P. Zolicaon;* but sometimes true *P. oregonius* (with the spot connected with the inner margin, and a yellowish cell of the primaries) have the abdomen as largely black.

The size is very variable. *P. oregonius* male expands from 80 to 98 mm. (3¼–3¾ inch); the female from 100 to 110 mm. (4–4½ inch). *P. Zolicaon*, male, from 78 to 86 mm.; female 92 to 94 mm. (100 mm., W. H. Edwards). The tail of the wings varies in length from 5 to 9 mm.; in breadth from 1 to 2½ and sometimes to 3 mm.; its form is very variable, strongly spathulated or rounded or pointed at the tip.

In Yakima Valley, July 5th, Mr. Henshaw found a full grown caterpillar feeding on wild parsnip, Mr. Stretch one on sage. The first one escaped by accident, but Mr. Stretch managed by ingenious contrivances to educate the imago, which proved to be *P. oregonius*. The caterpillar is very similar to that of *P. machaon* in form, color and pattern. As I am very well acquainted with the latter, I remarked directly a difference. The first transversal black band behind the head has a large gap in the middle, perhaps as large as the remaining part of the band, on each side. *P. machaon* has never this band interrupted, at least not in the specimens before me; nor find I mentioned such an interruption in any description or figure of the caterpillar; also not in Mr. Stretch's figure and description of *P. Zolicaon*, published by Mr. W. H. Edwards, and not in his description of *P. oregonius*, "PAPILIO," II., p. 120, The chrysalis agrees with that of *P. Zolicaon*. Mr. Stretch has made a colored sketch of the caterpillar. The chrysalis skin is before me.

After all, there is no doubt that *P. oregonius* is merely a variety of *P. Zolicaon*, mostly larger in size, more yellow, the black spot connected with the black interior anal band, which is somewhat dilated on tip, the black bands of the abdomen narrower.

P. oregonius (not *oregonia*, as Mr. Edwards writes), was very common on both sides of the Columbia River at Umatilla, June 24th to 26th; at The Dalles, June 23d, it was not observed, though eagerly looked for. It was not seen June 30th at Lone Tree on the Yakima River, but on returning to the same place July 18th, one old specimen was collected; probably *P. oregonius* had there appeared and disappeared in the time between those days.

At the mouth of the Natches river, at a higher elevation, July 4, the full-grown larva was still found, therefore the imago would not appear there before the end of July. The specimen raised by Mr. Stretch appeared July 25.

When *P. oregonius* was observed at Umatilla we all believed it to be *P. machaon*, the more so as Mr. W. H. Edwards had just published ("PAPILIO," p. 74) the capture of a specimen by Mr. H. Edwards at The Dalles, where we had looked for this species without success. A careful comparison of Mr. W. H. Edwards' paper with the materials at hand has given the following result.

The material consists for the European species, twelve specimens (Germany, Austria, Switzerland, Alsace) especially selected for the collection out of a very large number and representing all varieties in size, color and pattern, which I was able to observe; and one *P. hospiton*. The material for the Asiatic species (from East India, Amballa, Koolloo, Himalaya, about 6000′ high, Jalloree-pass, Himalaya, more than 10,000′ high) thirty specimens especially selected out of about 500 specimens as representing all varieties. I possess only one male from Tokio, Japan. Finally a couple collected by Mr. Chas. Wright at Owaska, Kamschatka, probably fr. Wilkes' Exp.

Exp. alar.
European spec., male, 72 to 88 mm.; female 82 to 92 mm.
Asiatic spec., male, 72 to 96 mm.; female 78 to 96 mm.
Kamschatka spec., male, 72 mm.; female 84 mm.
The tail of the hind wings.
European spec., length 5½ to 9 mm.; breadth 1 to 1¼ mm.
Asiatic spec., length 5 to 10 mm.; breadth 1 to 1½ mm.
Kamschatka spec., length 5 mm.; breadth 1 mm.

The main average of the size of *P. machaon* is smaller than in *P. oregonius* and similar to *P. Zolicaon*, though there exist males of *P. oregonius* of the same size of *P. machaon*. The tail of *P. oregonius* is mostly broader, but not longer.

The description of the var. ASIATICA Ménétries quoted by Mr. W. H. Edwards stated "the submarginal border of the hind wings to be very broad, with the inner edge straight, and reaching nearly the end of the cell." In my Asiatic specimens this border is broad 4 to 7 mm., and in the European specimens 4 to 6 mm. The inner edge of the border of the Asiatic is mostly less concave than in the European ones, and *exceptionally* nearly straight; others show the same curve as the European ones. In specimens from Switzerland the inner edge of the border goes as near to the cell as commonly in the Asiatic ones; and other Asiatic specimens show the cell even more distant from the border as commonly as the European ones. The final note by Ménétries, "the marginal border of the Himalayan specimens is very much larger," belongs, apparently, to a comparison with those of Kamschatka, as the words before the N. B., "de l' Himalaya et Kamschatka," prove. Indeed the latter have the marginal border of the male 2½ mm. broad, of the female 4 mm. As the specimens from Himalaya and from Kamschatka mentioned by Mr. W. H. Edwards were communicated to him out of the collection of the museum, my remarks cover the same specimens.

The remark by Mr. Felder (Wien. Z. B. Ges., IV., p. 363, Mr. Edwards quotes the pamphlet edition, p. 75) "*var. asiatica* discrepans alis adhuc brevioribus posticisque in regione anali magis productis," is refuted by the measures given above. Mr. W. H.

Edwards quotes "the hind wings are shorter," which would be a contradiction.

I am not able to concur with Mr. W. H. Edwards that the name, *asiatica* Mén., does not apply to the prevailing type in Southern Asia; Mén. specimen was only a little more exaggerated. Mr. Kollar, in Huegel's Kaschmir, vol. IV, p. 406, saw some specimens from Himalaya, "different from *P. machaon* from Vienna, Austria, by darker yellow (this is true for the Koolloo specimens, but those from Jalloree-pass are bright yellow, just as the European ones), a little broader marginal bands, the black nervures in the yellow fields broader, more similar to the local varieties of Southern Europe and Dalmatia."

De Haan (Papil. nederl. overz. bezit. p. 42) says, "*P. machaon* is also found in Japan, without difference in colors; but the hairs on the end of the abdomen and on the inner border of the hind wings are longer and cover a part of the middle cell, which is not the case in the specimens from Netherlands." This is true for Himalaya specimens before me, but I have some European ones with equally long hairs. One male of *P. machaon* from Tokio, Japan, is before me. The hairs are as described by De Haan; the yellow color is as bright as in the European specimens; the blue spots in the band of the hind wings are larger and brighter. The submarginal series of yellow spots along the margin of the front wings is large and orbicular, the first and the last spot are ovoid. The European specimens have those spots as half moons, sometimes in crescent-shape. The external border of the spots offers a straight but interrupted line. The Himalayan specimens have these spots partly as in the European ones, partly orbicular as the Japan specimen, or more or less rounded, sometimes very small and largely distant. The Kamschatka specimens have the spots similar to the European ones. Meigen has figured a variety from Europe with all the spots connected, forming a band. There is to be found in the Tijdschr. v. Ent., 1852, vol I., p. 129, a remarkable paper by Mr. Ver Huell, with a colored plate of *P. machaon*, caterpillar, chrysalis and imago, which I find nowhere used or even quoted. The late brother of Mr. Ver Huell had raised (as he believed) an imago from a caterpillar before the last moult, being in the third stage. The editor believes this statement to be erroneous, "as nearly all caterpillars had changed after the last moult from black to green." The editor tried to repeat the observations of his brother by collecting a number of not full-grown caterpillars and providing them with a satisfactory quantity of food. Nevertheless some of them were black when transforming into chrysalis. As he supposed, they had maintained the black color after the fourth moult. From one-third of these chrysalis were raised two imagos, somewhat crippled but enough developed to show the identity with the specimen raised by his brother, which is figured. Besides the very small size (the figure shows a dwarf expanding 55 mm.) "the black bands and spots are larger; the orange spots on the under side of the hind wings are rarely seen in a well-developed imago." Ver Huell declared this imago to be *P. sphyrus Huebn.*

The collection of the museum has a similar dwarf from Switzerland (length of upper wing 30 mm., in Ver Huell's figure only 28 mm.); but Ver Huell's description does not mention two very important characters represented in the figure; the basal half of the cell on the under side of the primaries is black and their sub-marginal band suddenly diminished before reaching the costal-margin. The statement of the rare appearance of the orange spots in the imago is not true, after the specimens before me.

The same volume of the Tidschr has a paper by Mr. M. C. Verloren, "Observations sur le *P. machaon,*" p. 90–108, which has been also entirely overlooked. The paper is the first, 'as far as I know, in which the influence of the cold temperature on the colors is acknowedged. Mr. Verloren observed many varieties in the coloration of the caterpillars; the black caterpillar is the most remarkable one. The black color replaces the green main color entirely; only some faint dorsal lines and some irregular green spots on the sides are left. The black variety belongs to the spring generation of the imago, at the beginning of the fall being rare, it becomes later dominant. The imago belonged to *P. sphyrus.* The paper contains besides many interesting observations not used by later Lepidopterologists.

I have never seen *P. sphyrus* (figured by Huebner, I, 155, p. 775–776.) from Europe. Huebner's figure represents, indeed, a *real machaon,* in size and colors exactly like the *var. asiatica* from the Himalaya.

Mr. Dutreux, Stett. E. Zeit., XV., p. 320, in his abridged translation of Ghiliani's paper on *P. hospiton* states, that *P. sphyrus* is on the whole similar to *P. hospiton;* the blue band above the orange spot is just as in *P. machaon* and not separated from the orange by a black border as in *P. hospiton.* I have only one specimen of *P. hospiton* before me, and I agree that it is a *very exaggerated* variety of *P. machaon.* Nevertheless, there exist more prominent differences, except the one quoted by Ghiliani between *P. hospiton* and *P. machaon.* The tails are excessively short, 2 mm.; the black band of the hind wings is much larger, covering nearly the outer half of the wing and reaching very nearly the cell. Nevertheless, the nervures in the basal yellow half are considerably less black than in the primaries and even less than commonly in *P. machaon;* the hairs of the abdomen and of the anal border of the hind wings are longer and more numerous; the under side of all wings differs even more, the basal part of the cell of the primaries is black; the marginal black band of all wings show between every two nervures a black elliptical curve, and the band of the under wings lacks on its internal margin the black bands; instead of them the small blue spots are internally surrounded by a very small black elliptical curve, at some distance from the inner margin of the band.

Zeller, in Isis, 1847, p. 216–219, speaks at some length on *P. sphyrus* and *P. hospiton*. *P. sphyrus* he puts with a ? as the spring form of *P. machaon* (Freyer, New Britr., I, p. 139, says; "*P. sphyrus,* Hueb., is simply a *P. machaon,*") pilosior abdominis dorso late nigro, alarum anteriorum venis dilatis, omnium fascia postica *latiore*. He concludes with acknowledging the very considerable variation of *P. machaon* in color, pilosity, size, shape and in the length of the tail.

Concerning *P. hospiton,* Zeller discusses in detail the figures and description of Herrich–Schaeffer, pl. 53, f. 249–250, p. 140. (They agree exactly with the specimen in the collection of the museum.) Zeller mentions specimens collected near Messina, Sicily, and concludes, finally, that the only difference of importance is represented in the black line separating the red spot in the angle of the hind wing from the blue lunule above the spot. But, he continues, the shape of the red spot (a crescent by Herrich–Schaeffer, and transversal ovoid in the museum's specimen) is variable in *P. machaon* and *entirely wanting* in the variety from Hamburg, figured in Freyer, New Britr., I pl., 74. This variety is even more remarkable as the figure of the under wing has on the under side a small red crescent divided from the blue spot by a large black band just as in *P. hospiton* ; the basal half of the cell of the primaries is black, except a small paler spot near the base, just as in *P. sphyhus*. Zeller does not mention these two differences.*

The only description of the caterpillar of *P. hospiton* by Mr. Boisduval, Index p. 1–3, is short, "green with black, whitish and red punctated, with aborted spinules; living on *Ferula communis*. " Mr. Zeller objects against the spinules, but Mr. Verloren, l. c., p. 95, says: " Before the fourth moult the caterpillar possesses short spines, which disappear nearly entirely after the fourth moult. In the black variety these spines remain more apparent than in the green caterpillars." Besides that Mr. Boisduval has not stated that his caterpillar was full-grown, Verlorens remarks cover the case.

Dr. J. Delaharpe, Contribut. à la Faune d Sicile, Lausanne, 1860, p. 33, describes as intermediate form between *P. machaon* and *hospiton* a large female from Sicily. The primaries are as in P. *machaon,* the underwings and abdomen similar to *P. hospiton.*

Mr. Bellier de Chavignerie, Am. Soc. Ent Fr., 1860, p. 674

---

* In *P. Zolicaon* the red spot in the angle of the hind wing is always separated from the blue lunule above it by a black line; but I find in some *P. oregonius* the indication of a black line, beginning from he outside to separate the red spot on the underside of the wings; even some of the var. *asiatica* show he same, but more faint.

says: All *P. machaon* from Sicily belong to *P. sphyrus*, but the spring form is darker and intermediate of *P. machaon* and *P. hospiton*.

I have given, as I believe, before ample and satisfactory proof concerning the variation in color of *P. machaon* and its most extreme forms, *P. hospiton*, *P. sphyrus* and *P. asiaticus*. It should be remarked that Dr. J. Delaharpe, l. c., p. 1–6, gives, 1860, very detailed and interesting examination of the causes which produce a change of color in butterflies and caterpillars. His paper has never been used in the literature concerning this question.

But not only the imago shows a large variation in color by *P. machaon*. The caterpillar and the chrysalis differ also considerably. Concerning the caterpillar, all stages, except the second, are well figured by Sepp. F. I., G. I., pl. 3.

The full-grown black variety, by Ernst T., I., pl. 34, f. 68, b.; by Freyer, l. c., pl. 74, the first stage and the full-grown black variety; by Ver Huell, l. c., pl. 7, f 1, the full-grown black variety. The full-grown green caterpillar is everywhere figured, sometimes together with the first form, Huebner Gesch. Schmett, pl. 47 and 49 with the chrysalis. Also De Geer gives good descriptions of the previous stages of the caterpillar. It is stated that the black variety gives imagos alike *P. sphyrus*.*

There are commonly two forms of the chrysalis, one green, the other gray, which forms do not belong to the different sexes.

There are numerous communications in the Ann. Soc. Ent., Fr., about the two forms, after 1868. Mr. Fettig had contended that the color of the chrysalis changes conforming to the attachment on green or dark objects. Mr. Fallou, ibid Proc. 1871, p. 54, proves, by experiment, that this is not the case. The same author and Mr. Mabile, l. c., 1872, Proc. p. 55, state the same difference in the chrysalids of *P. hospiton*. A figure of the chrysalis of the black variety of the caterpillar is given by Mr. Ver Huell, l. c., pl. 7., f. 2.

Having tried to state the hitherto known limits in which *P. machaon* of the old world can vary, I arrive to the knotty question of the American *P. machaon*. Of the specimens quoted by Mr. W. H. Edwards ("PAPILIO," I, p. 75), I have only seen the type of *P. aliaska*, Scudder. I had the benefit to compare this type, together with the specimen of *P. Zolicaon* with which the author had compared it. A comparison with the Asiatic form was in 1869 entirely impossible for the author, as then no specimen existed in American collections, and only very few in Europe. The type of *P. aliaska* expand 80 mm.; and is identical with *P. oregonius*. The tails are very short, a little less than 5 mm. long. Among the differences noted by Mr. Edwards, the first one is remarkable, the hind margins of the fore wings are convex in all specimens seen by him. This is exactly the case in *P. aliaska*.

---

* **Dr. Weisman Stadien, vol. II., pl. 2, f. 36, figures the sixth segment of the caterpillar of *P. hospiton* (apparently black var.), *P. machaon*, *P. Zolicaon*.**

Among the large number of *P. oregonius* very few have this border straight, and only one a little convex. Among *P. Zolicaon* one from Mendocino and one from Washington Territory have the margin as convex as *P. aliaska.* Among the Asiatic specimens those from Kamschatka and two from Koolloo, Himalaya, have the margin convex, several others only a straight margin. Among the European specimens before me some have a straight margin, none a convex one. But the two varieties quoted before as figured by Ver Huell and Freyer have a convex margin. I think if even all Hudson's Bay and Aliaska specimens should possess a convex margin, this can only be considered to be a local variation. Messrs. Scudder and Edwards do not mention the shortness of the tail; after all, my measures show its extreme variability.

The second difference noted by Mr. Edwards, that the black parts are more intensely colored and less dusted by yellow scales, and the nervules very considerably edged with black, is not true for *P. aliaska.* The large material before me proves this statement for the Himalayan specimens, and even for some European ones to be incorrect.

I have given considerable attention to another difference; the black sub-marginal band of the primaries between the yellow part and the row of yellow spots near the margin. Mr. Scudder has used the same character for the band on the upper side of the wing. I speak here only about the same band on the *underside* of the wing. It is very rarely entirely black, mostly more or less dusted with yellow scales in the middle of each cell. I find it entirely black in one *P. Zolicaon* from California, and three *P. oregonia* from Washington Territory. Mostly the yellow dust in the cells is connected to form a narrow or larger yellow middle line. Finally the band becomes yellowish-gray, bordered on both sides by a black line, the internal one broader. Near the anal margin the end of the band remains mostly black; near the costal margin the large marginal cell connected with the band is entirely black, or in part, or entirely yellow, with a broad black border on its basal end. The sub-marginal band is equally broad throughout or narrowed in approaching the costal margin. In the latter case two different ways are followed; or the inner margin of the band is straight to the tip and only gently sloping to the external margin, forming a more or less pointed band, or the two last cells have the internal black border removed more outwardly, so that those cells are similar to the steps of a stair. There exist intermediate forms where the internal margin of the second cell is oblique and connected at its base with the margin of the third cell so that this part of the band is sloping.

P. machaon from Europe has this band mostly straight, only the first cell narrower, broad 4 mm., first cell 2 mm., or broad 3 mm., first cell 2 mm. Some specimens from Austria, Alsace, and Switzerland belong to the intermediate form. The specimens from the Himalaya have the band as the European ones (sometimes larger, 6 to 4 mm., 4 to 3 mm.); a number belongs to the intermediate form (3 to 1½ mm.) and a few to the sloping forms (4 to 1¼ mm.). The Japan specimen has the European form, but the black borders of each cell are curvated instead of being straight. In *P. hospiton* the curvation is much more exaggerated. The couple from Kamschatka have very narrow sloping bands (3½ to 1 mm., 2½ to 1 mm.).

P. Zolicaon and *P. oregonius* have mostly sloping bands (4 to 1 mm., or even 6 to 1 mm.). But there are specimens of both species of the intermediate form and even of the European form; to the latter one belongs *P. aliaska* (4 to 2 mm.).

Therefore the band is generally straight in the European specimens; of the intermediate form in the Asiatic specimens, sloping in the American specimens. But everywhere specimens exist ranging exactly or nearly so with those of the other parts of the world. Besides the breadth of the band is equally variable in all those parts. Nevertheless the mostly sloping form of the band is about the principal character for the American specimens of *P. Zolicaon* and *P. oregonius.*

De Haan (in Verh. over de Naturl. Gesch. von Nederl. overz. Bez. Zool. Lepid. p. 42., pl. 5, f. 2) published and figured a a variety of *P. machaon* female of much larger size exp. 4½ inch (115 mm.); on the primaries the basal band less sharply cut and on the costal margin more nebulous, as is also the band along the margin of the under wings, which passes over the tip of the cell. Tails twice as long as usually; on the underside the four spots along the costal margin nearly yellow; on the under wings the middle band darker blackish, with sky-blue spots in the middle, internally cut in curves, externally ending in a yellowish color. Collected at Nangasaki, Japan, by Siebold.

Mr. Felder (in Wien. Z. B. Gesell., XIV, p. 314 and 362, No. 201) has made of this variety after two females from Japan his species *P. hippocrates.* This description, though somewhat difficult to understand, differs not from De Haan's, but he adds that the front wings are shorter, the hind wings longer, the blue moon above the red anal spot well separated from it.

The collection of the Cambridge museum possesses several males and females of this species from Kanagawa, Japan, collected by Mr. Gulick. After a comparison of those with a female from the Columbia River, Oregon, Mr. W. H. Edwards described *P. hippocrates var. oregonia* (in Trans. Amer. Ent. S., vol. V, p. 208). "It bears much the same relation to *P. hippocrates* as *P. aliaska* bears to *P. machaon.* With some exceptions it agrees well with females of *P. hippocrates.*" Mr. W. H. Edwards (in the Butterfl. of N. A., vol. II., part IX) describes the specimen as *P. oregonia* and gives the differences from *P. hippocrates.*

The three males from Kanagawa exp. 95 to 105 mm.; two females 105 to 112 mm.; the tail is 9 to 13 mm. long.

The females differ, indeed, more from *P. machaon* and *P. oregonius* than the other varieties. The yellow on the upper side is paler, more whitish, and of considerably less extent; the black ends more nebulous; the under side has more yellow, the black nearly disappearing; the blue moon above the red anal spot is separated by a strong black band. Of the three males one approaches in the color of the upper side more the females, but the two others are similar to *P. oregonius*, except that the yellow middle band of the primaries is narrower, the black band of the under wings larger, covering the end of the cell; the blue moon well separated by a black line. The tail of one male is not longer than in *P. oregonius*. The under side differs principally in the primaries where the black in the cell along the costal margin and along the nervures has disappeared. The black sub-marginal band is sloping, its internal margin waved (just as in the form from Tokio). The large black band at the apex of the cell is on the under side of all wings and in one female on the upper side, divided by a faint yellow line, which is more perspicuous on the Tokio specimen. The black band of the hind wings has the inner border straight or nearly so, reaching the end of the cell or not reaching it.

Mr. H. Pryer (in Trans. Ent. Soc., Lond., 1882, p. 486), on certain temperature forms of Japanese butterflies, says of *P. machaon*, "The difference between the temperature forms is very striking. March specimens are about 2½ to 2¾ inch in expanse and very pale colored, the summer forms expanding over five inches and are very dark, handsome insects. No alteration takes place in the markings, the colors being intensified only."

I think there can be no further doubt about *P. hippocrates* being only a marked and large variety of *P. machaon*. It is interesting to state that the colors and pattern of *P. hospiton* are about intermediate between the Tokio form and *P. hippocrates*.

Prof. A. Pagenstecher (in Verh. Heidelberg Nat. Medic. Ver., 1874, N. Serie. Heft I, p. 22, separ.), Ueber den ursprung einiger Europ. Schmetterlinge, speaks at some length about *P. hippocrates*. He has seen only the summer form, which he believes to be different from *P. machaon* and proposes for it the name *P. micado, because he has not seen intermediate specimens*," nor was he able to compare De Haan's work. He gives a full description. This paper has not been used by N. Amer. Lepidopterologists, though it treats at some length nearly all N. Amer. Papilios, and is very interesting, as he arrives to the final conclusion that the European forms are derived from the American ones. It treats at considerable length *P. asterias* and its related forms.

Can the separation of the American species be maintained? I answer boldly, *no!* After the examination of a hitherto unparalleled series of specimens, showing EVERYWHERE INTERMEDIATE FORMS, they should be considered as local or climatic varieties of one and the same species of *P. machaon*. I was very near supposing that *R. zolicaon* may be a spring form, as it is said for *P. sphyrus* in Europe. But though I consider the last statement as proved, for the American species double breeding has first to be proved. It seems more probable to consider *P. oregonius* as a climatic form, occurring in a region where nearly no rain falls through the summer, where the heat is excessive (we had only two weeks below 90° and more than a week above 100°), and which is, in fact, a sage-brush desert on basaltic soil. There is a gap still to be filled; the careful and exhaustive examination of the genital appendages of the male. The pattern is the same in *P. machaon* and *P. oregonius*, but there are differences in the finishing of the detail—as it is always in varieties or races. The parts are very complicated and satisfactory description should be given by specialists.

Mr. Pryer, l. c., p. 489, has now united eleven, perhaps twelve species of *Terias* as belonging to one and the same species, and remarks in conclusion, p. 491, that neither size, shape nor color can be relied on as guides for specific distinction and that temperature has a great evolutionary effect in the character of the insects. I believe that a revision of the N. Amer. Butterflies on this basis is a want. It is probable that *P. brevicauda*, *Bairdii*, *Indra*, *Pergamus* and probably *Americus* belong all to *P. asterias*.

The *Nymphalidæ*, *Satyridæ* and *Lycænidæ* will certainly not stay behind in similar reductions.

PAPILIO RUTULUS.

We collected at Yakima City, W. T., on milkweed, July 1 and 2, 4 males and 4 females of *P. rutulus*, and before a dead chrysalis at Portland, Or., Exp. male 96–104 mm.; fem. 104–110 mm. Length of tails 10–14 mm. The form of the tails is very variable. They are simply sloping from 3 mm. at the base to a little more than 1 mm.; or 1½ mm. broad, a little larger on the rounded tip, or twice as large on tip; or broader 2½ mm., and decidedly spathulated on the 4 mm. broad tip.

I have before me in the collection of the museum 10 specimens, 6 from California, one of them with the locality San Francisco, and 4 collected by Mr. Garman on the way from Gr. Salt Lake, Utah, to Ft. Bridger, Wy., on an elevation to 7000 feet, in July and August, male and fem. Exp. 90 to 104 mm., tail 8 to 12 mm. long, or sloping, or of equal breadth, rounded on tip or spathulated.

Concerning the literature about *P. rutulus*, nothing exists but the original description by Boisduval and Lucas, both 1852, and the translation of the first by Rev. Morris. Mr. Felder (Wien. F. B. Ger., 1864, p. 361) says: By the shape of the wings easily to be distinguished from *P. turnus.* The female looks — primo intuitu — very similar to *P. daunus.* Mr. Mead (Wheeler's Exped., 1875, T. V., p. 741, says: Closely allied to *P. turnus;* the only constant distinction seems to be that the submarginal ray (of yellow spots) on the underside of the primaries (*secondaries Edw.*, is probably a misprint) is continuous; in *P. turnus* it is broken up in distinct spots, S. Utah; Colorado in June. Mr. Strecker (Lepid. 1877, p. 128) describes dwarfish specimens Exp. 70 mm. from Arizona as var. or ab. No figure of *P. rutulus* is known to me.

Mr. Boisduval says: *P. rutulus* differs from *P. turnus* in that the upperside of the secondaries have not the fulvous crescent on the internal angle, and the underside has not the fulvous crescent in the border, nor the sagittate spots between the border and discoidal cellule of *P. turnus* (Ann. Soc. Ent. Tr., 1852, p. 280, and Morris Lep. N. A., p. 4). Mr. Lucas says: *P. rutulus,* though very similar to *P. turuus* differs by very marked characters. The black margin of all wings is always darker and internally less sinuated; the five bands of the wings are deeper blackish, broader, principally the basal one, and internally less dentated. The series of marginal spots on the secondaries has only five crescents, sometimes only four, one of them fulvous; the yellow submarginal spots on the underside of the primaries form a continuous band; on the secondaries the fulvous marks in the centre of the submarginal spots are wanting.*

The characters admitted as proving the difference between *P. rutulus* and *P. turnus* are:

I. The submarginal ray of yellow spots on the underside of the primaries forming a continuous band (W. H. Edwards; Lucas).

II. The lack of the fulvous crescent on the upperside of the secondaries at the internal angle (Boisduval; Lucas).

III. The lack of the fulvous marks and the sagittate fulvous spots on the underside of the secondaries (Boisduval; Lucas).

IV. The margin of the wings and the five bands are broader and of a deeper black (Lucas).

It is very obvious that none of those differences are of decided importance. The examination of the constancy of those characters gives the following result:

Concerning I. and III., all 18 specimens before me agree in showing the characters mentioned here. Concerning II., 10 specimens ♂ ♀ have no spot at all on the internal angle of the secondaries; 8 spec. ♂ ♀ have a small yellow spot, or only a few yellow scales, or a spot more or less elongated to 3 mm. All specimens show on the same place on the underside of the wings a large yellow spot. Concerning IV. the marginal band of the upper wings is mostly 7 mm. of 2 spec. 9 mm. The second and third band near the costal margin are 5 to 7 mm. broad. The statement of Mr. Lucas that the bands and the margins are of deeper black, and the margins internally less sinuated in *P. rutulus* does not agree with the specimens of both species in my hands.

---

* Dr. Behr. Stett. Ent. Z., 1866, p. 216, says: *P. eurymedon*, *rutulus* and one n. sp. can be perhaps nly local var. of *P. turnus* but ibid. 1868, p. 300, he says: *P. rutulus* is surely different from *P. urnus*,

There are before me 28 *turnus* males, females and ab.*P.glaucus* from the most different localities of the U. St. (Me., Mass., N. Y., Md., La.,. Miss., Ky., Tex.), and one yellow female from Owaska, Kamschatka. They were chosen out of a very large number to represent all varieties in the collection. The size is very different, the smallest one from S. E. Kentucky has the size and characters of pl. 5 of 1 W. H. Edw., representing the arctic form. A female ab. *glaucus* from the same locality measures only 82 mm. The largest male and fem. from Dallas, Tex., measure 125 mm., also pretty near 5 inches, more than Mr. Edward's maximum. The length and form of the tail is very variable from 10 to 15 mm., decidedly spathulated or not at all. A male from Osage, Miss., has a tail only 10 mm. long, but the spathula 4 mm. broad. Comparing the differences quoted for *P. rutulus* with *P. turnus*, we find as follows:

I. The sub-marginal ray of yellow spots on the under side of the primaries of *P. turnus* consists commonly of a series of separated spots of semi-circular or semi-oval shape, the convex side internally. Sometimes these spots are connected and form a band more or less waved internally, as the female from Kamschatka. A male from Lutherville, Md., and one from Kentucky have a straight, sloping band, only the two last spots near the hind margin separated. A male from Norway, Me., the same band, only the last spot separated, just in the same manner as some *P. rutulus*. The yellow female from Lutherville, Md., has the ray as commonly in *P. turnus*.

II. The fulvous spot at the internal angle is never wanting; the females possess a very large round spot; the males have a very small spot 2 to 1 mm. long, fulvous or red (yellow and more linear in *P. rutulus*). I have males from Texas of *P. turnus* with a very small yellow spot, only interiorly with a few fulvous scales; but a male from Osage has linear yellow spot 3 mm. long, just as some *P. rutulus*.

III. The fulvous marks and the sagittate spots are wanting in two males from Osage, Miss., and from Massachusetts. Indeed, there is a faint indication of fulvous scales in the cell above the eyespot of the anal angle, but I find similar indications by some *P. rutulus*. A female from Osage, Miss., has the fulvous marks and spots as commonly.

IV. The black bands and margins show no palpable difference. Considering these statements, there exist no character belonging exclusively to one of these two species, except that the females possess always a very large fulvous spot on the internal angle of the secondaries in *P. turnus*, but never observed in *P. rutulus*; besides that of the first species, black aberrations of the female occur frequently in the Southern and Middle States.

The caterpillar of *P. rutulus* is not yet known. The differences of the chrysalis from those of *P. eurymedon* are given by Mr. H. Edwards. Dr. Behr, l. c., 1868, p. 300, says the caterpillar of *P. rutulus* lives on fruit trees.

There is, I believe, no doubt that *P. rutulus* has to be considered as a Western form of *P. turnus* as long as no other differences are known to exist. I am more in doubt or better not able now to give a decided opinion about *P. Daunus*, as the material in the museum is not sufficient. It consists of seven specimens in very poor condition. The interior tail is broken. There were two large males collected on the same place with *P. rutulus* and flying promiscuously, July 3, at Yakima City and one smaller, very poor, at Spokane Falls, July 22. The large predominant yellow field with narrow and widely-separated black lines is, indeed, very striking. In the collection are three rubbed specimens collected together with *P. rutulus* by Mr. Garman, between Great Salt Lake and Ft. Bridger, at 7000′ about elevation. There were more than a dozen, but merely fragments, not worthy of being preserved. At the same time, July and August, and in the same place, Mr. Garman collected *P. eurymedon*. One *P. daunus* from Arizona is also before me. Of course, it is well-known that different species live together at the same place and time, but in examining nearer my specimens I am entirely at loss to find characters which can be considered to be good ones to separate *P. daunus* from *P. rutulus*. The internal tail of *P. rutulus* is never longer than in *P. turnus*; say 1 to 2 mm. About the tail of *P. daunus* I can say nothing, as it is wanting in all my specimens. All other differences consist in a larger or smaller development of the main color and the pattern without decisive influence. Entomologists with a larger and more satisfactory material at hand will have to give satisfactory characters to separate the two species. But I suppose this will be a difficult task, if not an impossible one. I do not know *P. pilumnus*.

I cannot speak with certainty about the relations of *P. eurymedon*, as I have only five specimens from the Gulf of Georgia in a somewhat tolerable condition before me. It may be only stated that two specimens collected by Mr. Garman, together with *P. rutulus* and *P. daunus* will be very difficult to separate from *P. eurymedon*, and have been, indeed, united with this species by experienced Lepidopterologists, who visited the museum. Both specimens are in very bad condition.

I possess the chrysalis of *P. turnus*, *rutulus*, *daunus*, but there is no possibility to ascertain differences of value after the comparison of one or two specimens.

A gap is also for those species that the appendages of the genitals are unknown. This gap can only be filled in a manner to allow scientific conclusions when the appendages of *P. turnus* are studied in many specimens, to begin with fresh or living ones. Only after the extreme limits of variation for one species are known, a scientific comparison with those of the other species will be possible and will give reliable results.

PARNASSIUS.

Mr. Stretch collected one female July 23, in Colville Valley, W. T., between Little Spokane and Loon Lake where granite first appears. A second specimen was seen. Exp. 65 mm. The whole body below, the front and the thorax above and the extreme base of the primaries were thickly covered with intensely yellow hairs. The veins of the wings on the under side were yellow, and also the membrane when the insect was fresh had a decidedly yellow tinge. Species known with yellow hairs are *P. Eversmanni* and its female (*P. thor*, as I am informed by Mr. H. Edwards) and *P. Nomion*, Fischer. A detailed comparison of the figures and descriptions of *P. Eversmanni* do not allow to bring the female to this species. *P. Nomion* is much larger, but, indeed, the marks and the pattern of the wings are very similar. I have no female var. *Smintheus* before me agreeing with the female from Washington Territory. The excellent figures of Mr. W. H. Edwards do not contain one exactly alike, pl. 2, f. 2, seems to be the nearest to it. Mr. W. H. Edwards speaks of partial covering of the body with dirty yellow hairs by *P. smintheus*, and as the pouch differs not notably from this species, it will be considered better as an exaggerated variety of *P. smintheus*.

Later, in W. Montana, August 7, I saw not far from the stage-coach, before New Chicago, some specimens flying, with the appearance of larger males of *P. smintheus*.

NOTES ON ORGYIA LEUCOSTIGMA.

By N. Coleman, Berlin, Conn.

A few notes on the various changes observed during the growth of the larvæ of *Orgyvia leucostigma*, Smith, may not be uninteresting to the readers of "Papilio."

My attention was first directed to these changes in the summer of 1877, by finding some larvæ differing in color from Harris' description of this species. Harris describes the larvæ as "of a bright yellow color, sparingly clothed with fine yellow hairs on the sides of the body, and having four short and thick brush-like yellowish tufts on the back, etc.," and with coral red retractile warts just back of these tufts. I need not give his full description, but only add that he said the caterpillars are found on rose bushes, apple and other trees and shrubs in July and August. Not knowing whether these belonged to a new species or to some variety, I watched for some eggs in order to experiment a little. I found some on an apple tree finally, and put them in a box, so that I could watch them from the time of their hatching. The eggs hatched out May 8, 1878. The larvæ were very dark-colored, head almost black, and showed some of the distinctive characteristics of this genus. They became lighter-colored after moulting. Nothing peculiar otherwise was noticed till June 14, when some of them moulted, and came out with *white* tufts on the back. Some of them pupated June 18, some June 19, but as they kept under the leaves during the latter part of their feeding, some might have retained the yellow tufts to the last, but some pupated while having the tufts white. My other duties prevented my watching them as closely as I desired, and I cannot say positively as to the number of times they moulted, but think it was five.

July 3 some moths made their appearance, both male and female, and as I wished for more fertile eggs to experiment further, I left them in the box. July 16 these eggs hatched, and the caterpillars obtained did not differ from those above referred to. Up to August 7 they had all lost the yellow tufts, except one, and that I put in a box by itself to see if sex had anything to do with the differences in color. One pupated August 14, and others the next day and the day following. August 15 the larva put by itself came out with white tufts, and pupated the 20th.

September 2 I found some of these caterpillars with yellow tufts on a rose bush and put them by themselves. By the next morning one of them had pupated and the others moulted during the day and gave me an opportunity to witness the operation. The caterpillar fastened its tail to the box cover, and in a short time the portion of the skin covering the head separated from the rest, and was soon detached by the head being curved under the body and rubbed on the box cover. The remainder split along the under side, and the caterpillar working its body back and forth, and from side to side, soon freed itself and came out with white tufts in place of the yellow ones it had previous to moulting. It seemed very much exhausted after the process. Some of the larvæ referred to August 7 changed back to yellow, and pupated in that coudition, coming out September 5. The one that pupated August 20 produced a female. Of the brood now under consideration about one male to every five females was produced, but in the earlier brood the proportion of males was larger. Nothing had been proved thus far as to whether sex had anything to do with the color of the tufts or other changes in the color, though at one time I thought I should be able to prove that the larvæ which pupated with the tufts white would produce females.

I observed one change in some that pupated September 20 that I had not noticed before, Just before they underwent this change the stripes of yellow hairs along the sides became nearly white, but with a greenish tinge. September 10 and 13 I found *Orgyia* larvæ on pear, as also on apple trees, with white as well as yellow tufts, and one in which the yellow stripes had become greenish-white. The caterpillars found September 2 all produced females, There was a difference in size as well as in markings among the males obtained, some being larger than others; some with no light spot on the wings, and some much lighter-colored than others.

I found the larvæ still feeding on apple trees as late as October 8. A pupa found October 4 was full of eggs, showing that the eggs develop pretty soon after the caterpillar goes into the pupa state.

In November I put some eggs in a box to be ready for further experiment. May 19, 1879, these eggs hatched and the little caterpillars had blackish heads but with a tinge of red underneath. A cluster of eggs from which I expected to obtain *Orgyia antiqua* did not hatch. The larvæ of *O. leucostigma* were found feeding in orchards by May 20. Of those hatched in the box some had lost their yellow tufts by June 3, and I observed that those with white tufts had darker-colored bodies than the others. I again separated the white tufted ones from the others, but soon found both colors in the boxes, but the white ones had their heads as well as the warts on their backs orange-colored. June 6 I observed the most singular feature of all thus far noticed. One of the caterpillars had all the hairs on the back of a beautiful velvety black.

The *Orgyia* that hatched May 19 pupated June 17, and produced the imago June 29, showing quite a variation in the time these caterpillars remain in the pupa state. Some came out males, some females, showing that sex could not be determined by the color of the tufts.

June 22 the larva with the black tufts came out white, and the 23d it changed again to yellow. It pupated the 30th, and in due time produced a female.

September 6 I found several fawn-colored *Orgyia* on a hazel bush, but did not succeed in rearing them. The tufts on the back were darker-colored than the rest of the hairs. After all my observations, I have nearly come to the conclusion that *O. leucostigma* and *O. antiqua* are only forms of the same species. I know not positively, and shall make farther observations the coming summer. I have learned that it is not safe to draw hasty conclusions if I have learned nothing else.

PREPARATORY STAGES OF CATOCALA CARA, GUEN.

BY G. H. FRENCH, Carbondale, Ill.

Egg.—Diameter .04 of an inch. In shape nearly globular, or a little flattened at the base; from this base to the middle the side is regularly curved. The top is a little depressed and contains a little button; from the middle to this depression the slope is straight instead of curved. Color olive brown, more greenish at first, with white striæ, below the middle these are equidistant, but above the middle they are in pairs, the base without striæ. Duration of this period 182 days.

Young Larva.—Length .15 inch, width .01 inch, width of head about .015 inch. Legs .12. Head and joint 1, rather pale reddish brown, shining; ocelli dark brown, joints 2 to 5 blackish brown, pale between the last two joints. Joint 6 is paler reddish brown than the head, the rest of the joints about the shade of the head except that the top of joint 7 is a little darker than the rest. The color on the joints from 6 to 12 is composed of four reddish-brown lines to each side, or eight in all, on a paler ground, the place of the dorsal line being pale. All the legs are whitish. There are small hairs over the body, apparently from the piliferous spots. Duration of this period 3 days.

After 1st Moult.—Length .20 inch. Ground color of body pale whitish-green, uniform throughout, the eight longitudinal stripes extending the whole length. Feet brown; tho first two pairs of prolegs showing as points about one-fourth the length of the others. Duration of this period 7 days.

After 2d Moult.—Length .33 inch. Color very dark brown or almost black, dorsal line whitish, one-fourth the width of the body in the middle, but narrower at the extremities, darker in the middle of joints 4 to 7. Subdorsal, suprastigmatal and substigmatal lines very narrow, feet a little paler than the body. Head concolorous, a white stripe each side of the middle of the face, clypeus and palpi pale carneous; the cheeks mottled with the same; jaws brown; the dorsum of joint 8 with a slight blackish elevation. Venter pale smoky-brown. There are about four more or less distinct wrinkles between the joints. Duration of this period 7 days.

After 3d Moult.—Length .90 inch. Head more distinctly heart-shaped than before. The whole body black with a series of crinkly whitish or yellowish-white lines, making the body striped with these two shades of color. On the dorsum the yellowish white predominates, below the subdorsal black is the prevailing color. The dorsal line is a series of long yellowish white ellipses with the central part black. Between this and the subdorsal line there are two distinct black lines and traces of a third between them in a series of black dots. The stigmata are in a black line; between this and the subdorsal there are three black and three yellowish-white lines. Substigmatal line yellowish-white, rather distinct, below that mottlings of this and black hardly separable into lines. Piliferous spots rather prominent, orange, ten on joints 1 to 3, twelve on the rest; the black elevation on joint 8 more prominent than before the moult. It is jet black and situated between the posterior pair of dorsal piliferous spots. The posterior pair of joint 11 more prominent than the others. A brown hair from each of the piliferous spots. The upper prominences of the head orange, the face black and carneous white, a black median line with one from near the top joined to this running to the palpi. Thoracic feet pale-brownish, the first and second pair of prolegs pale carneous gray, the others pale orange bordered with black. Venter dull whitish with the centre of each joint black. Towards the close of this period the dorsum became paler than at its commencement. Duration of this period 4 days.

After 4th Moult.—Length 1.45 inches. Marked similar to the last period, the ground color pale straw-color, finely spotted with black dots, the subdorsal being some of these run more or less together so as to give the appearance of a line. The orange piliferous spots a little more prominent; the ridge on joint 8 elevated .03 of an inch above the general surface, in color orange and black and a blending of these two. Head and top of joint 1 the same as ground color, mottled with blackish carneous, a darker streak blended with orange from the upper lobes to the ocelli. Feet carneous. Duration of this period 6 days.

After 5th Moult.—Length 2.10 inches. Ground color and black dots the same as in the last period; the piliferous spots a little darker orange on the back, the two posterior on joint 11 more prominent, with a little reddish tinge and a brownish-black mark extending from the back of each to over the spiracle. The protuberance on joint 8 a little more prominent, pale orange spotted on the sides with black, the orange extending down the sides of the body between joints 8 and 9. Head same as before the moult, the dark orange stripe on the face bordered behind with brownish black; ocelli 6, three black and the three outer yellowish. The anal segment tinged with carneous. A carneous fringe each side of the body, just above the legs. First and second pairs of prolegs two-thirds the size of the others and used as legs. Venter orange, joints 6 to 8 each with a large black spot in the centre; spiracles gray, edged with black. Hairs on the sides gray, those on the dorsum black or gray tipped with black.

Mature Larva.—Length 2.35 inches; width of head .20 inch; of joint 7, .35 inch; height of tubercle on joint 8, .06 inch. Marked as at the beginning of the period, but the black dots are more intense in some parts than in others, so as to give faint stripes, the dorsal and one below the subdorsal light, the one above the subdorsal and the stigmatal dark. These are so faint as not to be readily perceptible except in places. Other characters the same as at the beginning of the period. Duration of this period from 8 to 17 days.

Chrysalis.—Length 1.45 inches; depth through thorax .45 inch; through joint 1 of abdomen, .43 inch; joint 2, .44 inch, and from this gradually tapering to the tip. Wing cases extending over joint 5, the legs and antennæ reaching the same distance. Cephalo-thorax, wing and tongue cases coarsely shagreened, the abdomen finely punctured, the tip of the last joint very coarsely so. This ends in four hooks, two longer than the others, and two more hooks arising from the punctured portion at a little distance from the four. These hooks were fastened into a bunch of silk in the posterior end of the cocoon. Color dark brown, almost uniformly covered over with a white bloom. Duration of this period from 37 to 45 days.

The eggs from which the larvæ upon which the above observations were made were deposited October 6, 1881, from a female captured a few days before, 29 eggs being obtained. They were kept through the winter in a jelly dish and began hatching April 6, 1882, nearly all of them hatching that day. When first hatched they were very active and continued to be so during the first third of the larva period. They were first fed on the most convenient willow at hand, but this happened to be of a pubescent species which they refused to eat. This was not noticed till quite a number had died. A change to the young leaves of *Salix Nigra* proved more agreeable to their tastes and seven were carried through to the pupa state, six of these producing imagines. On opening the seventh cocoon some time afterward it showed that the moth had emerged from the chrysalis but had failed to get out of the cocoon. The cocoon is formed by fastening the leaves together with but very little lining, and that at the posterior end.

The larvæ hatched April 6th, and spun up May 11, 12, 18 and 20, respectively. The moths emerged June 23, 24 and 26, making the larva and pupa periods cover a little more than two months and a half. I have never taken this species in June, the usual time being from the first of August to the close of the season. There is scarcely time for the development of another brood from the last week in June to the first of August, and from this fact I am a little suspicious that the development of these was accelerated by confinement, though they were kept from any direct influence of the sun. Whether there is more than one brood in a season is a question for future observation. The parent moth was of the uniform brown type, but all the progeny were of the form *Carissima*, some males and some females.

SOME NOTES AND QUERIES ABOUT MOTHS. I.

By A. R. Grote.

Recently, in conversation with Mr. Henry Edwards, I spoke about some curiously neglected species of our moths, and my friend suggested that I should write out my remarks for "PAPILIO." This must be my excuse for the present gossipy paper, and I thought that its appearance now might be opportune in connection with the issue of the "New Check List," in the preparation of which I went over the literature concerning the species here mentioned. Some things which I find occasion to say may explain the synonymy of the "List" and supplement notes given in its pages; so upon this and other accounts it will be best to arrange my remarks under the heading of the different Families of moths.

I. SPHINGIDÆ.

Ninety-one species of this family are cited in the check list and one of doubtful value: *Cablei.* Of this number one, *Procne*, will have to go, being probably founded on an example of the East Indian *Lucasii.* Instead, it is probable that Dr. Clemens' *Lyncea* is not the male of *Ficus*, as he suggested, but a distinct form. As we have *Ficus* from Key West, it is probable that its companion *Syces* (=*Inornata*, of Clemens and *Ficus* of Ménétries) will also occur in our territory. I have not identified *Cupressi* of Boisduval. The figure leads me to suspect an *Ellema* and perhaps we have to do with a variety of *Coniferarum.* The odd series of abdominal marks are not like *Ellema.* To the genus *Hemaris* must be probably referred two species described by Dr. Boisduval as *Etolus* and *Pyramus*; the latter, as Mr. Hy. Edwards suggests is probably=*Uniformis*, which is=*Ruficaudis*, Kirby, according to Mr. Walker. Mr. Walker's determination I am willing to consider correct, although Kirby's description has certain points of difference when compared with our species. *Gracilis* is a totally different species and does not belong to the same group with *Uniformis.* Mr. Hulst claims to have bred *Uniformis* and *Thysbe* from the same larvæ. He further unites *Buffaloensis* as a small and *Floridensis* as a large form or variety of the same species. As to *Buffaloensis* he takes no note that Prof. Lintner describes the larva, and also that the cell of forewings gives an apparent distinctional character. *Buffaloensis* is always a smaller insect than *Uniformis*, whether bred or captured specimens are considered, and a dwarfed *Uniformis* would still be distinguishable from *Buffaloensis.* The species are all near, *Gracilis* being the most easily identified, and they must be the subject of careful study before pronouncing decided opinions on the different forms, which are of extreme interest. The species of *Hemaris* will always be of uncertain standing until the larvæ are well understood. There was a distinct necessity for naming and separating the different forms. Before we wrote upon them, all the different forms were called either "*Diffinis*" or "*Thysbe*," and though now there may be too many names, they must be carefully studied before being all thrown together again as varieties.

I close my notes on these *Sphingidæ*, by again explaining Dr. Boisduval's remark as to *Phaeton*, that we gave the name to the insect first in 1865, some two or three years before receiving specimens from himself, and that we were under the impression when we published this name that it was a MSS. one of his, which it now appears it was not, although the name given to an unpublished plate of the species when we described the insect in our Synonymical Catalogue. We again described the species and genus from Dr. Boisduval's specimen before the appearance of his name of *Erato*, which name, in his final work, Dr. Boisduval withdraws, and calls the insect *Phaeton*, which is its correct designation. The singular antennæ of this little Sphinx remind us of those organs in the still more aberrant form, *Arctonotus* of Boisduval,* and which I am the first to locate among the Macroglossians, I believe; in his last work Boisduval follows this example. The genus *Cautethia* replaces *Oenosanda* of Walker, there being already a genus *Oenosandra* when Walker published his name.

It contains three species, apparently, viz.: the type *Noctuiformis*, from St. Domingo, which I have examined, and which is certainly different looking from our South Florida insect, *Grotei* of Mr. Edwards. The Cuban species was identified by Dr. Herrich Schæffer as *Noctuiformis*, and he has figured it as such, but it is the same as our Florida form, very probably. The third species is Boisduval's *Spuria* from Mexico, larger but much like the other two. With regard to the queries as to our *Sphingidæ*, we have to find out the species described by Boisduval as *Pyramus*, *Etolus* and *Cupressi*, while the probability is that we have all three forms under other names. Mr. Butler's surmise that we did not know *Lugens* is incorrect, for at once I recognized its re-description as *Eremitoides* by Mr. Strecker. The student of the literature of the group will find that we were the first to recognize the character of the adhering scales on the vitreous fields of the wing in *Hemaris*, and that Mr. Strecker's accouut of the changing character of our views is fanciful. We were at first doubtful about the value of the character of the inner edge to the outer band on forewing, and hesitated to form species upon it. Now it is found that this character is reliable, but whether it characterizes dimorphic or true species is not clear. In the case of *Uniformis* we must admit, until Mr. Hulst's discoveries are contradicted, that it is a dimorphic form of *Thysbe* (*Pelasgus*). Among the species in the typical group of *Hemaris* not examined by me are *Senta*, Str. and *Metathetis*, Butl. As catalogued by me, I think the species are correct so far as our knowledge goes; I regret that I placed *Floridensis* as a variety of *Uniformis*, until more material is received. Our type is, I think, in Central Park collection. A specimen I received from Florida had the margin of the band like *Floridensis*, but the abdomen like *Fuscicaudis*. Was this a dimorphic form of *Fuscicaudis*, equivalent to *Uniformis?*

---

*Incorrectly attributed to me in the Brooklyn List.

When Clemens wrote, *Ampelophaga*, Boisd., was an unknown species; but I found that this was the equivalent of *Pandorus*, wrongly called *Satellitia* by Harris. Clemens has left us another query, viz: What is *Deilephila oxybaphi?* described by him in the larval stage only. Kirby's species in Coleoptera, no less than Lepidoptera, do not seem easily recognizable from his descriptions. He has described a *Deilephila intermedia*, that most authors seem to think cannot well be our common *Chamœnerii*.

On pages 44 to 45 of our Synonymical Catalogue we give the names of the doubtful species. Some of the species, such as *Scyron* and *Japix*, had been merely wrongly credited to our fauna by older writers. The debatable names at present are:

Deilephila intermedia, Kirby.
" *oxybaphi*, Clemens.
Pachylia Lyncea, Clemens.
Paonias pavoninus, Geyer.
Macroglossa Etolus, J. Leconte.
Macroglossa Pyramus, Boisd.
Sphinx Cupressi, Boisd.

Dr. Clemens' species of *Chœrocampa*, described from specimens no longer in the Collection of the Academy at Philadelphia, are all extra limital. His *Macrosila Instita*, as published on page 14 of our Catalogue, is the same as *Ochus* of Klug, a species curiously neglected by Walker in the British Museum Lists.

With regard to the genera adopted in the "New Check List," they have been thoroughly tested so far as priority is concerned. I cannot find an objection to one of them and I think they stand upon a strong scientific basis and ought not to he disputed without grave cause. That in a few cases, as the genera allied to *Smerinthus* and *Chœrocampa*, certain of them are of subgeneric rather than generic value, may be still a matter of dispute. I think the student will find that this can only be properly questioned of two or three, and that, although there may be some prejudice against them, more will be lost than gained in lumping the species all together again. As they stand, they fall in with what has been observed by a student of the Sphinxes of the world, such as Mr. Butler, and, in great part, Dr. Boisduval. Where I differ from Mr. Butler, as in adopting *Dilophonota*, nearly identical in time of publication with *Anceryx*, I do so because Burmeister's genus is more limited in extent and is conceived in the sense in which I employ it. Hubner's genus *Phlegethontius* is equivalent to *Macrosila* as used by Dr. Clemens; the type of the latter seems different and the older name is used for properly associated species.

When we compare our fauna with that of Europe, we find that it is twice as numerous in species—91 to 40. Ours contains no true *Macroglossæ* of the type of *Stellatarum*, and no species of *Acherontia*, though loose writers such as Maasen have credited Mexico with a species of the latter genus.

In the European genus *Deilephila* we are poor, having but two, representative of two European species, *Livornica* and *Galii*, but apparently sufficiently distinct. In the clear-winged Macroglossæ, belonging to *Hemaris* (and its subgenus *Hæmorrhagia*) we have many forms against two in Europe. In the typical Sphinges, genus *Sphinx* (=*Lethia*), of which *Ligustri* is typical while *Convolvuli* is to be referred to *Phlegethontius*, we are rich in closely allied species against one in Europe. We have at least one true *Smerinthus* from California, congeneric with the European *Ocellata*. Our species from the East diverge from this type and resemble the species *Kindermanni* of Lederer from Asia Minor; again we have in *Versicolor* a representative of the genus *Ampelophaga*, also from Eastern Asia. In *Calasymbolus*, *Paonias* and *Cressonia* we have three American structural types of *Smerinthi*, while *Triptogon* has a great number of Eastern Asiatic species, hardly more than races, so near do they run together.

Our fauna comes mainly from the South, whence we receive the Chœrocampid forms. *Pachylia*, and perhaps *Argeus*, may breed in Florida and Southern Texas. The specimens taken occasionally on the coast and up the valley of the Mississippi are probably immigrants from the West Indies or Mexico. The *Manducæ* come to us largely from the South, and *Phlegethontius* is more numerously represented in South America. *Amphonyx Antæus* may be only an occasional visitant at Key West; the genus is West Indian and South American.

From Western and Northern Asia we receive *Hemaris*, *Deilephila*, *Smerinthus*, *Triptogon*, *Hyloicus* and *Sphinx*, though the development of the latter genus is North American. From the South we receive *Aellopos*, *Cautethia*, *Amphion*, *Enyo*, *Philampelus*, *Argeus*, *Pachylia*, *Daremma*, *Diludia*, *Amphonyx*, *Phlegethontius* and *Dilophonota*. With Eastern Asia we have *Eusmerinthus* and *Ampelophaga* in common. Genera peculiar to our fauna are *Lepisesia*, *Euproserpinus*, *Thyreus*, *Deidamia*, *Arctonotus*, *Everyx*, *Paonias*, *Calasymbolus*, *Cressonia*, *Ceratomia*, *Dolba*, *Ellema*, *Exedrium;* as a rule, genera containing single, comparatively striking and isolated forms. We may tabulate them as follows:

Genera of European and Asiatic Extraction.

	No. Species.
HEMARIS (typical)	10
DEILEPHILA	2
AMPELOPHAGA	1
SMERINTHUS (typical)	1
EUSMERINTHUS	2
TRIPTOGON	2
SPHINX	15
HYLOICUS	3
Total	36

This number loses its importance when we examine the species themselves. The forms of typical *Hemaris* are probably a little overstated. The development of *Sphinx* is *American*, rather than *European*. In Europe but one species, *Ligustri*, occurs. Our forms on my list, down to *Canadensis*, seven in number, are probably strictly typical; the remaining eight depart more or less, some approaching *Hyloicus*, however, a European type. Again, others are peculiarly American in appearance, but hardly give generic characters, such as *Gordius*, *Eremitus*, *Dollii*. On the whole, then, we have eight generic types coming from the Old World, the kinds of two of them, *Hemaris* and *Sphinx*, having multiplied and developed upon American ground. These types may be held as coming from the North, and as related to a former Circumpolar fauna.

Genera of Southern American Extraction.

NAMES OF GENERA.	*No. Species.*
AELLOPOS	2
CAUTETHIA	1
AMPHION	1
ENYO	2
PHILAMPELUS	4
ARGEUS	1
PACHYLIA	1
CHŒROCAMPA	1
DAREMMA	3
DILUDIA	3
AMPHONYX	1
PHLEGETHONTIUS	4
DILOPHONOTA	6
Total	30

We have thus thirteen generic types from the South, and although the species are less numerous than in the genera of Old World extraction, I have explained this circumstance away, and this present category of our Sphingid genera includes the most powerful element in our fauna.

Genera peculiar to North America.

NAMES OF GENERA.	*No. of Species*
LEPISESIA	1
HAEMORRHAGIA	4
EUPROSERPINUS	1
THYREUS	1
DEIDAMIA	1
ARCTONOTUS	1
POGOCOLON	4
EVERYX	2
PAONIAS	1
CALASYMBOLUS	2
CRESSONIA	1
CERATOMIA	1
DOLBA	1
ELLEMA	3
EXEDRIUM	1
	25

I think that the study in this way of the members of any one lepidopterous group will lead to interesting results. But such are only attainable when the material has been closely studied and arranged as I have tried to do with our *Sphingidæ*. Since my studies in the synonymy of the family, the results of which appeared in 1865, I have kept working on the genera and think these, as given in the "New Check List," have acquired a comparatively stable and final condition which will allow of conclusions as to geographical distribution being safely drawn. Especially interesting are such groups as *Hæmorrhagia*, which is an American development of an Old World type *Hemaris*, influenced apparently in the extension of the thorax by such South American types as *Aellopos*. But so long as writers call all or most of our *Caudiberbes* species of *Macroglossa*, it is evident that an erroneous idea is given at the outset to our fauna, which does not contain a single form really belonging to that Old World genus.

While the neuration is not greatly varied in the *Sphinges*, I find that it is most varied in the *Smerinthi*. Good characters are offered by which we may, for instance, distinguish *Cressonia*, in every way a strongly marked and peculiar form. That there is in this group considerable variation in antennal structure also is noticeable. We shall find that *all* the appendages vary in ultimate structure, accordingly as a group is plastic or subject to differences. The position of the wing in repose is also unusual in the *Smerinthi*, the hind wing being pushed upwards; several of the species look like curled and brown leaves. They are less obvious and more sluggish than the other *Sphinges*. Our most beautiful species is, I think, *Calasymbolus Astylus*.

Our greatest rarities from the East are *Flavofasciata*, *Cerisii*, *Luscitiosa* and *Jasminearum*. The first named is taken in Canada, Northern New York and Maine, the last will probably be found more abundantly southward. The larva of *Catalpæ* has turned out to be very numerous in various localities in the South, but the Moth has proved difficult to rear. With several other Sphingidæ, I took *Versicolor* twice at sugar near Buffalo, N. Y.; from its flight I could easily tell it from *Myron* and *Choerilus*, which came abundantly to bait, but it was harder to "bottle." It had a different way of taking the bait from the difference in tongue. *Hageni* has been taken in some quantity in Kansas by Professor Snow, and seems to occur throughout the Southwest as well as in Texas; I have not heard of its being found near the Atlantic seaboard. Our commonest species seems to be *Lineata*, after this, *Celeus*; *Abbotii* is also very well distributed. The species of *Hemaris* are more local; *Thysbe* is found over the widest territory. Mr. Hy. Edwards speaks of *bushels* of *Achemon* larvæ found in California on the vines; it is rarer in the East, but on Staten Island vineyards it was more usual than *Pandorus*. Of late years *Inscripta* has become rarer. *Labruscæ* has been found as far North as New Jersey, borne on the winds from more southerly latitudes.

In his "Synopsis of North American Sphingidæ," a work somewhat ambitious in appearance, but not evincing a corresponding study of the literature of the group, Dr. Clemens describes the following species, which are not generally known:

Calliomma Volatica from Brazil; *Deilephila oxybaphi* (larva) from Penn.; *Chærocampa Procne* said to be from California, but probably = *C. Lucasi* from East Indies: *C. Thalassina*, of which Butler says: "Seems to be allied to *Amadis*;" *C. Versuta* from Mexico. Butler seems to have overlooked *Calliomma Volatica*. Whether the type has gone the way of that of *Procne* I do not know, but it is certainly probable.

THE PREPARATORY STAGES OF ARCTIA NAIS, DRURY.

By G. H. French, Carbondale, Ill.

Egg.—Diameter, .03 inch, color, white; an obtuse cone, about as high as wide, flat at the base; smooth. These were found on a ripe strawberry in a single cluster, hatched 5 days after finding. They had the appearance of being freshly deposited so that it is probable this period is from 5 to 6 days.

Young Larva.—Length .06 inch, color dull pale gray, head black on the cheeks, a triangular space above the mouth of the same color as the body. On each joint there is a transverse row of tubercles, six distinguishable, black, from each arises a black hair as long as the thickness of the body. Feet 16. Duration of this period 6 days.

After 1st Moult.—Length .10 inch. Ground color similar to that of the preceding period; the tubercles dark brown instead of black, more than one hair from each. Head as before. Duration of this period 8 days.

After 2d Moult.—Length .20 inch. The only change aside from size is that the ground color is a little darker, and there are more hairs in the fascicles arising from the tubercles than before the moult. They are more active than they have been before. Duration of this period 6 days.

After 3d Moult.—Length .45 inch. Ground color leaden gray; dorsal, subdorsal and substigmatal stripes white. In the middle of each joint the subdorsal is orange, and there is also an orange spot just below this, above a tubercle. There are 10 tubercles to each joint distinctly visible now; the tuft of short hairs arising from each is black above but gray on the sides. Head black. Towards the close of this period the following changes were noticed: Ground color dull black, a little paler on the sides and venter; dorsal line yellowish white, subdorsal and substigmatal blackish; joint 1 somewhat lighter than the others. Head and thoracic feet jet black; prolegs pale, at the tip, orange spots on the sides dim. Duration of this period 7 days.

After the 4th Moult.—Length 1.00 inch. Color uniform black, the head shining, sides of the prolegs pale, and an indistinct pale dorsal line. As before, the fascicles of hairs from the dorsal tubercles black, those from the sides brown; those on joints 1 and 2 all brown. The interior part of the neck is reddish. Duration of this period 7 to 8 days.

After 5th Moult.—Length 1.70 inches. Color of body, tubercles and hairs as before, with the exception that the hairs on joint 2 are black, on the dorsum. Dorsal line nankeen yellow, faint on joints 1 to 3 and 11 to 12, but on all of the others distinct and expanded somewhat in the middle of each joint, those in the middle of the body expanding most; stigmata, orange. Head and thoracic legs brownish black; the prolegs brown, not very dark; venter slate color. No trace of any lines but the dorsal.

Mature Larva.—Length from 1.65 to 1.70 inches; width of head .15 inch; of middle joint .28; between joints .20; head brownish black, clypeus, palpi and antennæ whitish, the tips of the latter black; color of body and dorsal line as at the first of the period, as also the tubercles and hairs; 10 of the tubercles to each joint. All the other points as given before. Duration of this period from 3 to 11 days.

CHRYSALIS.—Length .75 inch, from anterior end to end of wing cases .43 inch, these not reaching quite to the posterior part of abdominal joint 5; antennæ and leg cases .35 inch from end.

Depth, thorax .25 inch; abdominal joint 2, .27; joint 3, .30; joint 4, 31; joint 5, 28; joint 6, 27; joint 7, 25. From the posterior part of joint 8 it tapers rapidly to the end. In shape nearly cylindrical. the bulge in joints 3 to 5 being mostly dorsal. The last joint terminates in 10 hooked, brown bristles in two clusters; the tubercle supporting these is striated longitudinally. Anterior portion rounded, the prothorax containing two slight elevations covered with short hairs. Color black. Head and thorax finely granulated, the first four abdominal joints punctured with a few larger depressions, mostly smooth and shining. Duration of this period from 11 to 12 days, one day devoted to spinning in addition to this.

As intimated before, the larvæ from which the above descriptions were taken were obtained from a cluster of eggs found on a ripe strawberry. There were 29 of the eggs, but only two larvæ were reared through all their changes. The eggs were found May 20, 1882; the first moth appeared July 13, the second, July 22, making a total period of from 54 to 63 days, or about two months. From captures for several years I had supposed the species to be two brooded, one in May from larvæ that hibernated and one in September, but a two month's period from egg to moth will give us three broods in a season, one in May, one in July and one in September. I have this year found them in July and the first of August, though I had not noticed them before.

The specimens reared from these two larvæ were first a ♂ of the form *Phalerata* figured in Harris, and second form *Nais* a ♀; though this can not be altogether a sexual variation, for my other specimens of this form are males. The male answers well to Harris's figure and description of *A Phalerata*, having "the hind wings next to the body, and sides of the body, reddish," the general color of the wing being reddish, but not so much so as next to the body. The costal margin of hind wing is black, with two small spots along the outer margin. My cabinet specimens vary from two to four of these spots. The second form or the ♀ has the hind wings more distinctly red, a black costal margin to which is joined a discal dash and large apical spot, and a long angular spot below the apex on the outer border. Further along in the outer border towards the anal angle are two large, nearly round, black spots joined together. This seems to answer to Dr. Morris' description of *Nais* with the exception of the color of the hind wings. All my males of this form agree nearly with this in marking, but the ground color of the wing is lighter. I have not Drury's plate or description by me, but may say that this corresponds with another ♀ *Nais* identified for me by Mr. A. R. Grote. Of course there is a bare possibility that the cluster of eggs on the strawberry was deposited by more than one moth, but there is not much probability, as they were in a single cluster. If we take it for granted that the two forms had a common parentage, then there is no longer any doubt of the identity of *Nais* and *Phalerata*.

With regard to *A Decorata*, I cannot as yet say as much. I have for some time regarded this as a form of *Nais*, but this season I have reared it from the larva, and found that it differs from the larva from which *Nais* was raised, as the following brief description of larva of *A Decorata* when full grown will show: It is black, rather thick, ten tubercles bearing clusters of hairs to each segment, the second and third on each side from above dark orange of rather a smoky hue, the tips black. Part of the hairs on the sides and all of those on joint 1, top as well as sides, are brown, the rest are black. Stigmata bright orange; no dorsal line. From this it may be seen that the identity of this with the others is a subject for future investigation.

TWO NEW SPECIES OF THANAOS.

By W. H. Edwards.

THANAOS TATIUS.

Male.—Expands 1.6 inch.

Upper side of primaries umber-brown, blackish on disk and to base, the outer limb free from white scales; on outer edge of disk towards costa a light brown patch; on costa four sub-apical silvery dots, in zigzag line; one such dot in upper median interspace, and one, rather obscure, against end of cell; along hind margin a row of small patches of bluish-white scales; the usual (in this genus) extra-discal band is made up of large lanceolate and elongated black spots, separated, each edged on the outer sides by bluish-white scales, which scales form a conspicuous serrated line across the wing.

Secondaries black-brown with an indistinct series of lighter patches beyond the disk; fringes of primaries concolored; of secondaries white, cinereous at outer angle.

Under side of primaries lighter, the spots repeated, the one against cell distinct; along hind margin a row of white points, and at inner angle a white patch; beyond the disk an indistinct series of whitish patches, almost obsolete in the middle of the wing; the apical area dusted white. Secondaries uniform blackish-brown; along the edge of hind margin a macular white band, represented by dots on the upper half.

Body above dark brown, beneath same, but the thorax with many dark grey hairs; legs dark brown; palpi brown with dull white hairs interspersed; antennæ black, on the underside ringed white; club black above, the under side and tip ferruginous.

From a single male.

This fine species is readily distinguished from any of the white-fringed allies by the pure brown color of the marginal area of primaries, with no dusting of white, and by the conspicuous extra-discal band and its whitish servated edging.

THANAOS CLITUS.

Male.—Expands from 1.5 to 1.7 inch.

Upper side of primaries umber-brown, so much dusted with whitish scales and clothed with white hair as to discover the ground color only in small patches, as along the hind margin, and also a little within the margin and on basal area; the usual extra-discal spots are black, on the upper half the wing long, acute, below broad, lanceolate; on middle of disk a broad, black cross-band, reaching inner margin, and the basal area is mottled with black; a clear brown, but not well defined patch, at end of cell; on costal margin four sub-apical diaphanous dots, three in straight line, the fourth a little inside; a similar dot in upper median interspace, and one at the end of cell. Secondaries uniform black-brown; fringes of primaries black-brown, of secondaries white, cinereous at outer angle.

On under side the spots are repeated, a little enlarged; primaries have a marginal row of white points, sometimes meeting; also an extra-discal series of light-brown patches more or less dusted with white scales; in some examples, however, these also are wanting, unless next inner margin, and the whole limb is thinly dusted white, through which runs a submarginal series of brown patches; in all cases there are many white scales over apical area.

Secondaries immaculate, except for a few whitish points along posterior part of hind margin, which sometimes are developed into a white macular band.

Body above black-brown, thorax and abdomen beneath grey-brown; legs dark brown, with ferrginous hairs on under side; palpi dark brown, the tips of the hairs whitish; antennæ black, on under side slightly annulated white; club black above, ferruginous below and at tip.

From 6 ♂.

This species is allied to *Tristis*, Bd.

NOTES ON LEPIDOPTEROUS LARVÆ.

By A. S. Packard, Jr., M.D.

The following larvæ were collected during the past season in Maine, while engaged in collecting material for a revised and enlarged edition of Bulletin No. 7 of the U. S. Entomological Commission (Insects injurious to Shade and Forest Trees), which is to form the Fifth Report ot the Commission to be prepared under the direction of the Commissions of Agriculture. The writer would here ask aid from lepidopterists in the way of specimens and notes concerning any insects found on any kind of forest or shade tree, in order to render the work as complete as possible.

Lycomorpha Pholus, Harris. Body cylindrical, long and slender, with five pairs of abdominal legs. The head is deeply bilobed, each side large and smooth, black mottled with horn-color. The body is provided with numerous tubercules from which arise long black dorsal or paler lateral hairs, which are a little longer than the diameter of the body; each segment is beset with 16-20 of these small hair-bearing mamillæ or warts. The general color of the body is horn-brown; the thoracic and abdominal legs of the same color. The tubercles at the end of the body are paler than elsewhere, making the end of the body appear above as if speckled with white. Length 15 ^{mm}

The pupa is short and rather thick, the end of the body very blunt, with no apical horns or tubercles. Length 10 ^{mm}

The caterpillar was found late in July, wandering about at Phipsburg, Me. Without doubt the food plant is lichens, as we have caught the moths in Maine, in former years, flying about lichen-covered rocks. The caterpillar we captured spun, July 31st, a thin silken cocoon with scattered black hairs on the outside. It changed to a pupa August 4th, and August 20th or 21st the moth appeared.

Acronycta occidentalis G. & R. The larva of this moth was observed wandering about at Providenee on September 21st. The body is cylindrical, hairy, with a black hump on the 8th segment, and a broad black longitudinal band. The general color of the body is a livid leaden hue. The larva began to spin a cocoon September 23, the moth appearing early in the following summer.

The pupa is 20 ^{mm} in length, of the usual form; the tip of the abdomen is obtuse, with eight long, even, stiff chitinous setæ which are incurved at the end. The basal abdominal suture is well marked, being very deep.

I am indebted to M. Grote for the identification of this and the species of Hypena.

Hypena baltimoralis Guen. The larva of this species was common on the red maple at Brunswick, Me., early in August. The body is very slender, and at first sight it must be regarded as a geometrid. The body is cylindrical, slender, tapering considerably toward the long anal legs, which are outstretched. The segments are moderately convex, the sutures being very distinct. The head is rather small, smooth, somewhat bilobed. All the legs, both thoracic and abdominal, are of the same color as the body, which is pale pea-green, of the color of the upper side of the leaf of the red maple, but slightly paler. The sutures between the segments are often straw-yellowish. The body sometimes has a slight purplish tint, the head remaining green. Length 22 ^{mm}

August 5th one began to spin a cocoon, the pupa appearing the 7th. It is dark chestnut brown in color. The moth issued August 17th.

Dichelia sulphureana Clemens.

Body tapering towards each end. The head is honey-yellow, considerably narrower than the body. The body is pale livid green with a corneous hue. There are no lines or any distinctive markings except the four usual warts or small tubercles which are arranged as usual in this family in a trapezoid. From these warts arise hairs one-half as long as the body is thick. At the end of the supra-anal plate is a flattened tubercule with spines. Length 15 m. m.

Common on *Pinus strobi* at Brunswick, Me., and also found on *P. rigida* the first week in August.

August 5th it began to make a slight cocoon by drawing together the leaves into a rude tube and spinning a slight cocoon between them. The pupa was found between the leaves August 7th. The moth appeared August 16–17th.

It agrees well with Robinson's Pl. V., fig. 37, though differing in some respects. According to Fernald's Catalogue of Tortricidæ, this common species feeds on the clover, Vitis, Ranunculus acris, and is an inquiline in willow galls.

Teras ferrugana, S.V. The larva was beaten from the white pine (*P. strobi*) at Providence, October 5th. The body is rather large, 20 mm in length, broad and flat. Head flattened, held out horizontally, reddish above, with a dark broad line around the edge. The body is green, with a reddish tint. The cervical shield is concolorous with the body and edged behind with dark black-brown, forming a curved line. Over the body above are scattered pale flecks.

The caterpillar pupated in the bottom of the breeding box, without making any cocoon. The pupa is slender, 8 mm in length, of the usual pale horn-brown color. Each abdominal segment is provided with two dorsal transverse rows of close set spines. The tip of the abdomen is suddenly truncated, compressed from above downwards, the edge is hollowed within, the edge itself curvilinear, with a small spine on each side.

The moth appeared October 20th or 21st. I am indebted to Prof. C. H. Fernald for kindly identifying it. According to his Catalogue of Tortricidæ of North America, this common European species feeds in Europe on the beech, birch and oak (Heinemann), and, according to Walsh, is in this country an inquiline in galls of *C. Salicis strobiloides*. It could not have been mixed with other Tortricids in my breeding tin box, as it was the only Tortricid in the little box, hence I think there is no doubt but that it at least occasionally feeds on the white pine. The larva is very characteristic and easily recognizable.

I have reared Tortrix (*Cacœcia*) *rosaceana* Harris, from *Betula* *populifolia*, the moth appearing in Maine, September 1. I have also raised *Thera contractata* Pack., from a pupa beaten out of the hackmatack, the moth appearing the first week in September.

SOME NEW NOCTUIDÆ AND NOTES.

By A. R. Grote, A. M.

Spragueia magnifica, Gr.

Base of fore wings very pale yellow, with a dark basal, mesial, longitudinal stripe sprinkled with chalybeous scales; internal margin also narrowly striped. Median space defined by outwardly oblique orange line, fusing with an outer orange line or band, exerted superiorly; the median space is thus narrowed inferiorly; ground color whitish or pale yellow; the small chalybeous discal spots are surrounded by the orange inferior shade of median space; a subterminal black band, edged with and surmounted by orange; terminal space pale yellow before the dark fringes. The smallest and most beautifully marked of the genus. Arizona, coll. B. Neumoegen, Esq.

This species differs from *Leo* by its smaller size, the narrower subterminal plumbeous band, widening a little inferiorly, which is not indented or broken; the even, curved edge to the pale basal field comes down to the margin at middle of wing; the costal black dots are absent; the submedian pale streak of the ground color at base is much wider, the inner margin here being only narrowly plumbeous. A most beautiful and vividly colored insect, very near *Leo*, but quite distinct on examination.

Spragueia Inorata, n. s.

A small, inconspicuous species, with the usual dark spots and bands absent. Ochrey orange, dull colored; reniform, an open ringlet, orbicular a minute dark point. Median space wide. Traces of the pale median lines, the t. a. nearly straight. Fringes slightly soiled inferiorly. The wing is darkest along internal margin and on terminal margin irregularly. Hind wings pale fuscous, subtransparent. Head and thorax like fore wings. The color is a pale buff-yellow, the darker shading somewhat dull ochrey orange. Texas. One specimen, coll. B. Neumoegen, Esq. This form approaches *Tarache*, slightly, in appearance.

Besides comparative details as to the ♂ genitalia and antennæ, the genus *Spragueia* differs from *Erotyla*, by the narrower primaries, which are also proportionately longer; the longer vein 9, and the different origin of 7 and 8, while the hind wings are only 7-veined, its European genus having them 8-veined. The ornamentation is different in pattern, and the American genus contains a number of little Tortricid-like species, the European having only one, comparatively broad-winged, more like *Erastria*. The genus comes to our fauna from the South, and our Cuban and West Indian species are congeneric; *Pardalis* from Florida is, I think, described also from the West Indies, but I have not been able to compare types. The difference in the neuration of hind wings alone is a generic character quite remarkable and constant, so far as I have examined the species.

EUSTROTIA DISTINCTA. n. s.

Size of *Apicosa*. Distinctly marked with black and white. Base of wing blackish to tremulous black t. a. line, behind which is a following upríghe white shade band. Ground color obscure grayish olivaceous. this obtains on median space outwardly, and encloses the small pale reniform. T. p. line much exserted and irregular. A black apical patch with a white shading between it and t. p. line. Another on internal margin before the angle, edging the t. p. line outwardly. Hind wings fuscous, with an ante marginal shade, like *Apicosa;* beneath paler, with double shades and dot. Fore wings pale along terminal margin beneath. Above, the black apical patch is partially cut by the pale s. t. line. One good specimen. Coll. B. Neumoegen, Esq.

PROTHYMIA PLANA. n. s.

Smaller than *Coccineifascia* and without the band. Fore wings dark yellow with contrasting pinkish-red fringes. No markings. Hind wings translucent stramineous. Beneath all pale yellowish, as is the body. On primaries beneath the fringe is discolorous. One specimen. Arizona. Coll. B. Neumoegen, Esq. So simply marked as to be easily known.

NEUMOEGENIA POETICA. Grote.

In describing this species I omitted to state that the costal region of primaries above was broadly white. It might be assumed from the rest of the description, as the ground color is given as "white," and the species is so simply marked and striking, no confusion could occur from want of detailed remarks.

EUSTROTIA PROPERA. Grote.

A second specimen shows traces of the blackish subterminal line, marked on costa, and the terminal space is centrally soiled with blackish. The fringe is dusky. This minute form can be confounded with no other; it belongs to the *Apicosa* series.

Genus PLAGIOMIMICUS.

Front with a large, deep, empty cup, extending beyond the facial vestiture and thus completely exposed. In *Polenta*, the globose clypeus is surmounted by a shallow excavation with a slight central protuberance. In *Basilodes* there is merely a wrinkled prominence, the rim of which is hardly raised; this holds for the second species, *B. Chrysopis*; in which it is a little smaller. In *Stiria* the prominence is somewhat cordate, with better defined edge, and there is a button-like protuberance inferiorly where the base is indented. This holds for *Stiria Sulphurea*, Neum., except that the protuberance is pushed in a little without being central; the excavation itself is a little more circular and smaller. In the two species of *Stibadium* the front is much as in *Basilodes;* in *Aureolum* Hy. Edw., an exquisite species, the excavation is a very little deeper and smaller than in *Spumosum*, in both partly concealed. In *Stiria* the patagia are prominently deflected. I find the labial palpi much longer in *Basilodes*, as compared with *Stibadium*. What Mr. Smith says as to the relationship of these genera is partly correct; I have overlooked the *resemblance* which *Basilodes* bears to them, but I should not unite them; each has some distinguishing points and *Stiria*, especially, somewhat strongly departs. *Basilodes*, *Stibadium*, *Stiria*, *Plagiomimicus* and *Polenta* belong to a group, oscillating between *Calpe* and *Heliothis*, which I have called *Stiriinæ* in the New Check List.

But, contrary to Mr. Morrison and Mr. Smith, I demonstrate the presence of a tibial claw in *Polenta Tepperi*, from an Arizonian specimen in coll. B. Neumoegen, Esq. The difference between *Polenta* and *Plagiomimicus* is thus confined to a modification of clypeal structure. It is not more distinct from *Basilodes* than the other genera. Mr. Smith accuses me of "resurrecting" *Trigonophora;* if he will look in Lederer, he will see that I took the genus from Lederer, and that I have followed this most distinguished authority in using Hubner's genus. In two very important statements I find Mr. Smith thus quite wrong. I shall allude to others. Mr. Morrison's statement that *Polenta* had unarmed tibiæ always seemed to me doubtful from the great resemblance between *Polenta Tepperi* and *Plagiomimicus Pityochromus* (*Media Morr.*) in shape and ornamentation. The genera are not sufficiently distinct. Consult Bull. B. S. N. S. Vol. 3, pp. 75–76, 1875.

PLAGIOMIMICUS EXPALLIDUS. n. s.

Wings pale olive ochrey with the s. t. line white-edged on costal region, margining outwardly the costal, dark triangular shade. T. p. line oblique, even, edged with white inferiorly. Median space somewhat yellowish and darker inferiorly. Stigmata lost in the pale shading of the discal cell, which shows a dark dot in the middle. Hind wings whitish. Smaller and differently colored, of a faded hue compared with the dark *Pityochromus*. Montana, Coll. B. Neumoegen, Esq. Expanse 26 mil.

Genus CAPIS, *Grote.*

A Deltoid genus with broader and squarer wings compared with *Sisyrhypena*. Antennæ (♂) simple, ciliate. Vestiture flattened, hairy, very silky. Eyes naked, tibiæ unarmed as usual in this group. Ocelli; eyes unlashed. Body slender, untufted. Abdomen not exceeding secondaries. Labial palpi loosely held, exceeding the front, third article short, second with longer and thicker scales. Tongue rather weak.

CAPIS CURVATA, *Grote.*

A rather small species, deep brown on primaries to the curved s. t. line running from apices downward somewhat obliquely to within internal angle; outside of this the wing is paler. Hind wings dark fuscous. Head and thorax dark brown. A male, received from Mrs. Fernald, taken at Orono, Maine. Previously I only had the female. The species is nearly concolorous, and may be known by the curved s. t. line.

AZENIA. n. gen.

Vestiture flattened hairy. Eyes naked. Form very slender, like *Spragueia*, wings narrow, long, primaries widening a little outwardly. Antennae simple. Legs unarmed, thinly scaled. Front with infra-clypeal plate prominent, but overshadowed by a parallel, long, distinctly tridentate, flattened, clypeal protuberance. Labial palpi closely scaled, a little longer than in *Xanthoptera*.

AZENIA IMPLORA. n. s.

Pale lemon yellow. Two ochrey dots in place of t. a. line. A median ochrey shade band, irregular and faint. One or two dots in place of t. p. line. Minute points at base of pale fringes. Hind wings white. Beneath whitish; costa of fore wings a little clouded. Head and thorax like fore wings. Abdomen pale, a little exceeding secondaries. Arizona. coll. B. Neumoegen, Esq. The armature of the head is disproportionately large.

XANTHOPTERA CLAUSULA. n. s.

Allied to *Semiflara*, but much smaller. Thorax and base of primaries bright lemon yellow. A fine white line, perfectly straight, divides the yellow base from the leaden outer field which is delicately frosted with white, and encloses a vague white cloud-like spot, the reniform. Fringes interrupted with pale yellowish above internal angle, outwardly. Hind wings translucent fuscous. Abdomen pale. Beneath pale, glistening, with reflected darker shades on fore wings. Arizona, Coll. B. Neumoegen Esq.

The labialpalpi are short; front globose. Eyes large and naked. Agrees with *Semiflava*, which I have left with the type of the genus *Nigrofimbria*, in *Xanthoptera*.

ESCARIA. n. gen.

Wings frail, wide, abdomen untufted, a little longer than hind wings, body slender. Labial papi short. Eyes naked, unlashed. Front with a moderately prominent, rather wide, cup-shaped protuberance, nearly hidden by the erect vestiture and with a central protuberance, not reaching over edges of cup, set in erect vestiture which fills the cup itself. Vestiture mixed, flattened hair and scales. Legs apparently unarmed. Seems to fall in between the *Tarache*-like genera and *Eustrotia*. Size of *E. Carneola*.

ESCARIA CLAUDA. n. s.

Grayish fuscous. In the ♂ the ornamentation is better written. Orbicular paler, spherical. Claviform moderate, its upper edge accentuated in black. Reniform moderate, lunate. Lines fine, perpendicular, edged with pale or whitish, especially in ♀, which is darker, and the white s. t. line quite prominent. Hind wings pale fuscous, trace of median spot and extra mesial line; a vague terminal band. Beneath grayish fuscous, with common line and faint discal spots. Four specimens, one with a reddish tint which seems a variety. Arizona. Expanse 20 mil.

Coll., B. Neumoegen, Esq.

PREPARATORY STAGES OF *SEIARCTIA CLIO.* PACK.

By Dr. Hermann Behr.

I do not know if the metamorphoses of this rare insect are known, and I therefore deem it an entomological duty to publish what a lucky chance has revealed to me on this subject. We are indebted for this interesting discovery to Mrs. Curran, wife of Dr. Curran, the well-known author of valuable works on Microscopic Botany. Five caterpillars were brought to me by Mrs. Curran, resembling most those of a species of *Halisidota*—in fact, they were so like those of the *Halisidota* of the oak (*H. Edwardsii*) that I at first thought them identical, but I afterwards observed that the hairs do not spring in a stellate form from tubercles as in *Arctians and Lithosians*, but that they grow in bushes like those of the larvæ of *Halisidota*, and of the European *Syntomis Phegea*, and the tufts were combed backwards as in *Ecpantheria scribonia.*

The food plant was *Apocynum androsæmifolium.* The larvæ were full grown when I received them, so I cannot judge if they would eat other plants of the *Apocynum* or *Asclepias* group. I tried *Vinca* and *Nerium* without success.

On the 20th of May the first began to spin and formed a web exactly like that of *Halisidota.* On the 12th of July I found in the breeding box a pair of *Seir. Clio*, the following day another, and on the 18th a single female.

The history of this transformation confirms my idea of the systematic position of *Seirarctia* and *Ecpantheria* being near *Halisidota* and *Syntomis*, to which genera also the neuration of the hind wings of the present insect bears a very close relation.

NOTES ON LEPIDOPTERA.

Larva of Amorbia humerosana. Clem. Body thickest near the middle, uniformly yellowish green, with a few scattered whitish hairs. Thoracic plate green, a curved lateral black dash on the first segment. Head pale brown, greenish in the centre, with a lateral black dash. Thoracic and abdominal legs and feet concolorous with the body, the anal feet black. Length when at rest twenty-two mil.; when crawling, 25 mil. Width in widest part, three mil. Food plants, the poison ivy (*Rhus toxicodendron* Mx.), and the spice bush (*Lindera Benzoin* Meis). Pupated September 16, in a folded leaf. Imago May 21. L. W. Goodell, Amherst.

NEW LOCALITIES FOR BUTTERFLIES. July 22d I saw a specimen of *Limenitis arthemis* Drury on the side of a mountain ravine, and on September 5th, one of *Papilio cresphontes*, Cram. in an open field. I did not succeed in capturing either, but had good views of both and have no doubt of their being these species. Both were fresh specimens, *cresphontes* especially, seeming to be just from the chrysalis. *L. Arthemis* must be exceedingly rare in this section, and I believe this is the first specimen of *cresphontes* reported in this state. L. W. GOODELL, Amherst, Mass.

STRETCH'S BOMBYCIDÆ OF NORTH AMERICA. Under date of June 20th DR. H. A. HAGEN, writes from Portland, Oregon, "In San Francisco I saw the plates for Stretch's new work on the Bombycidæ. They are really splendid, and the photoliphography admirably executed. I was so much interested in Stretch's work, and in the author himself, that I urged him to join our party, and was very glad when he decided to do so. I really believe that his work will be a great step to a better understanding of the Bombycidæ, the more so as Stretch has an excellent knowledge of the larvæ of many species. I think also that many spurious species will be eliminated and brought together."

CERATOCAMPA REGALIS AT SUGAR. I had a remarkable experience last evening. I was sugaring a small wood close to my garden with poor success, when, lo! upon the trunk of a small ash tree was a splendid *C. regalis*, sipping the sugar with all the enjoyment of a *Catocala*. I had no net and only a small cyanide bottle, so I gazed in astonishment and despair for a few seconds, when it leisurely fluttered away. It is known that this species is attracted by sweets?
DAVID BRUCE, Brockport, New York, August 4, 1882.

MOTHS AND BUTTERFLIES OF MONROE COUNTY, NEW YORK. Butterflies have been very late and scarce this season, *D. Archippus* not having as yet appeared (August 4th) and only a few *P. Rapæ* and *C. Philodice* having been seen. One very light *Pieris Protodice* was taken last week. This species was very common here in September of last year. I took forty larvæ of *M. Phæton* on June 1st. They fed on almost any low plant or shrub, many of them on *Typha Latifolia*, but they appeared to prefer *Lonicera*, and in confinement *Plantago*. I raised thirty-one examples. The remainder were stung by parasites, but kept on feeding two weeks longer than the healthy subjects. *Pap. Cresphontes* has occurred this season in abundance, though previous to 1880 it was almost unknown in this neighborhood. In that year a lady bred a fine ♀ from a larva found in the garden on *Dictamnus fraxinella*, and last year I discovered larvæ feeding on garden rue, *Ruta graveolens*. This year it has been seen in great numbers. I have taken seventy larvæ feeding on Prickly Ash, have reared all to the chrysalis, whence they are now emerging in beautiful condition. Yesterday I had the pleasure of seeing on the windows of my "Vivarium" living bred specimens of all the species of *Papilio* found in this district. viz.: *Ajax*, *Turnus*, *Troilus*, *Asterias* and *Cresphontes*. The last named species appears to be entirely free from parasites, not a single example that I have found being stung. DAVID BRUCE, Brockport, New York.

ANISOTA SENATORIA, Smith-Abbott. During the past summer this moth was very prevalent in Columbia County, New York. It made its appearance at Oak Hill, the residence of Mr. Hermon T. Livingston, in the township of Livingston in the latter part of June, and before the middle of August the larvæ had consumed the leaves of all the young oaks, the older trees not escaping severe spoliation. I observed that the oaks in the woods adjoining the place were not attacked, but that the trees skirting the forest suffered as badly as those upon the lawn, and were nearly stripped of their leaves. In the early season I destroyed myriads of the insects in the grasses under the oaks, just after pupation, and also some five thousand eggs soon after depositure; but notwithstanding these precautions against a damaging visitation, severe disfigurement, if not injury, to the oaks resulted from the insatiable larvæ. A very close observation of the habits of this moth has led me to determine that they can readily be exterminated from oaks situated in a lawn by trimming up the lower branches. The moths pair in the grass under the oaks very shortly after pupation, and as the wings of the female are small in proportion to the size of her body, she is unable to make a very extended flight. The eggs as discovered by me were attached to the underside of the leaves at the terminal twigs of all the branches nearest the ground, the branches at an elevation of twelve or fifteen feet not showing a single deposit.

FREDERICK CLARKSON, New York City, December 1st, 1882.

ALETIA ARGILLACEA HUBN.—This moth appeared at sugar October seventh and eighth at Karner (formerly Centre), N. Y. October seventh, four examples were taken, one of which was crippled and not able to fly and was crawling up a tree to taste the sugared bait. October eight, twelve examples were captured, one of which had just emerged from chrysalis and was not fully developed. It was leisurely climbing a sugared tree shaking out its wings in the act of development. It was allowed to remain until its wings were fully expanded and hardened, when it too fell a victim to the cyanide bottle. As I have not kept a record of all the moths captured at sugar previous to the month of October this year, I cannot say positively whether I have taken *Aletia* earlier in the season. I have, however, captured them at sugar every autumn since 1877. The weather after the seventh and eighth turned cold and stormy, consequently I did not again sugar until October 12th, but no more of this species have been captured since. The moth is taken with *Glaea*, *Lithophane* and *Scopelosoma* all of which are known to hybernate. May not the *Aletia* also pass the winter in this manner? This is an interesting subject for consideration. The specimens captured were all of them bright and fresh, and apparently had very recently come forth. I am convinced that the moth breeds in this latitude, and that its larvæ feed on some *Malvaceous* plant. I think that the facts set forth clearly prove that the present brood have not emigrated from a more southern latitude.—JAMES S. BAILEY, M.D. Albany, N. Y., Oct. 25, 1882.

FENNARIA SEVORSA. Gr.—This species must be known as *Phægarista Sevorsa*. I have just discovered that it belongs to this East Indian genus, the occurrence of which, in North America, is extraordinary. Having but one type, which I could not denude, I failed to study the neuration and mistook the position of the species, which is quite distinct from its old-world congener.

A. R. GROTE.

NOTICE TO SUBSCRIBERS. The present number concludes the second volume. The index and title page will be issued shortly. Intending subscribers to Volume III., 1883, are requested to forward their names to the editor as early as possible.

ERRATUM. On p. 139. Pamphila Python ♀ should be P. Python ♂.

Issued January 24, 1883.

PAPILIO.

Organ of the New York Entomological Club.

Vol. III.] January, 1883. [No. 1.

[The following paper was written for the November number, but owing to a delay in transmission of the proofs to Mr. Edwards, it was thrown over to January.]—Editor PAPILIO.

NOTES ON THE COLLECTION OF BUTTERFLIES MADE BY MR. H. K. MORRISON, IN ARIZONA, 1882.

BY W. H. EDWARDS.

This collection embraces about 100 species, all taken in the vicinity of Fort Grant, Cochise Co., and on Graham Mountain. It is remarkable for the many species of certain families and for the absence of others. In the Hesperidæ it is especially rich, embracing no less than 38 species, or one-third the collection. Of these 9 are Thanaos, and 8 are Eudamus. In Lycæna there are but 7 species, in Thecla 8, in Chrysophanus none. In the Lemonidæ, 6. The Satyridæ number but 2, and these are Neonymphæ, viz., *Rubricata*, Edw., and *Henshawi*, Edw. I should have expected one or more species of Chionobas, Satyrus, Hipparchia and Coenonympha, but none appear.

In Papilio 4 species, one of which, *Philenor*, Linn. is common at the East, and one which I regard as a variety of *Rutulus*, Bd. In Parnassius nothing. In Pieris only 2, *Protodice*, Bd., and *Sisymbri*, Bd., the latter of which was very rare. In Colias but 2, *Cæsonia* and *Eurytheme*. In Terias 2, *Nicippe* and *Mexicana*. In Anthocharis but 2, *Stella*, Edw., and *Hyantis*, Edw. In Callidryas 1, *Eubule*. In Argynnis but 1, *Nausicaa*, Edw. In Melitæa 3, none of them belonging to group I of my Catalogue, 1877, i.e., the *Chalcedon* group; 1 to group II, or *Palla* group, the others, southern forms, belonging to group III. In Phyciodes but 3, of which *Pratensis*, Behr, and *Mylitta*, Edw., fly from the Rocky Mountains to Pacific. The third, *Picta*, Edw., is southern, very common in New Mexico. In Eresia 1, *Texana*, Edw. In Synchloe 1, *Crocale*, Edw. In Grapta but 1, *Satyrus*, Edw. In

Limenitis and Heterochroa 4, Apatura 1, Paphia, 1. In Libythea 1, *Carinenta*, Cram.

A few observations on some of these species will be proper here.

1. PAPILIO DAUNUS. Bd.

Three examples were sent me, all immense, expanding, ♀ nearly 6 inches; the male 5.75. On the ♀, the breadth of the black border between the outer tails is nearly one inch. The Northern examples of *Daunus*, or those which fly in Nevada, have scarcely more than half the superficial area of these Arizonians.

Mr. Neumoegen received through his agent, Doll., in 1881, two blown skins of the mature larva of *Daunus*, and three living chrysalids. One of the latter was given me, and Mrs. Peart made drawings of it, after which I put it in alcohol. The other two Mr. Neumoegen retained. One of them, on 7th Sept., 1882, gave imago, the other is still alive, and will pass the second winter. So protracted a chrysalis term I never have known for any Diurnal, though not very unusual in certain Sphingidæ.* I cannot discover any tangible difference between the chrysalis of *Daunus* and that of *Turnus*. The caterpillar is similar to that of *Turnus*, and has the same black and yellow stripes across dorsum, at junction of segments 5 and 6, and has also an ocellated spot on side of 4. But in these examples, this spot is round, with a round pupil, and higher on dorsum are two quadrangular solid yellow spots with black eyes, one of these being attached to the ocellar spot, the other separated. In *Turnus* there is an obovoid black ring, with two elongated inside spots, or there is an eye-shaped spot, outlined black, with an elongated black pupil. *Turnus* varies, therefore, as to these spots on 4, and a series of *Daunus* might do the same, but at present the only difference I discover is in the shape and number of these spots.

Mr. E. M. Dodge, while at Boulder, Colorado, last summer, found both *Daunus* and *Indra* plenty (the latter on the summits of the mountains, just as it has been found by Mr. Henry Edwards, in Nevada), and observed *Daunus* ♀♀ ovipositing. By confining one of them in a bag over a wild plum branch, he obtained about 50 eggs, and mailed them to me. Unfortunately they never reached me, and so a good opportunity was lost for getting at the whole series of preparatory stages.

PAPILIO RUTULUS. Bd.; VAR.

Of this I received 6 ♂♂, and have inspected 1 ♀, belonging to Mr. Neumoegen, taken in Arizona. For several years I have endeavored to obtain eggs or larva or drawings of *Rutulus*, but have utterly failed to get any one of the preparatory stages. Mr. Mead, while in California, in 1878, induced a ♀ to lay eggs for him, on cherry, and the larvæ hatched. But in subsequent journeyings they starved. In PAPILIO, for September, 1882, Mr. H. Edwards relates that he had the larvæ of California *Rutulus* past third moult, but then lost them. The stages, as described by him, do not agree with the figures of same stages of *Turnus* as given in Vol. II., But. N. A.

---

* In Can. Ent. 9, 135, Jacob Boll notes a like occurrence with occasional chrysalids of *P. Cresphontes*.

The distinctive marks of *Rutulus* of the Pacific Coast, as compared with *Turnus* of the Atlantic, are many.

1. The fore wings of *Rutulus* are more falcated.

2. The tails are straight, of nearly or quite even width, and not spatulate.

3. The common black band, which crosses middle of cell of secondaries, is more decided. It is heavy and black, as in *Eurymedon*. In *Turnus* it is faint.

4. On the under side there is an absence of fulvous or orange on hind wings, both in the marginal lunules and in the median interspaces of the disk. *Turnus* has much orange.

5. In the ♀ *Rutulus*, the blue scales on secondaries, upper side, form a stripe, broken at the nervules. In ♀ *Turnus* they form conspicuous lunate patches, materially unlike the other.

6. The color of *Rutulus* ♂ is sometimes very dark throughout, what is called Indian-yellow.

7. In ♀ *Turnus* there is a large sub-rotund fulvous spot at outer angle of hind wings, upper side. In ♀ *Rutulus*, either no spot there, or a narrow line, as in *Eurymedon*, almost always yellow.

8. No black females of *Rutulus* have been seen; but black females predominate vastly as we go southward, in *Turnus*. In fact, in the trans-Mississippi region, and through Texas, a yellow female *Turnus* is an extreme rarity. Now many Texan butterflies fly also in Colorado and Arizona. Even the black ♂ of Lyc. *Violacea* is taken in South Colorado. So that the absence of black females of this Papilio is remarkable, and unaccountable, on the theory that *Rutulus* is a var. of *Turnus*.

In many of these points *Rutulus* agrees with *Eurymedon*. If the latter were colored like *Turnus* it would pass for *Rutulus*. In fact, *Rutulus* is nearer *Eurymedon* than to *Turnus*.

Rutulus, as it manifests itself on the Pacific Coast, should unquestionably be regarded as distinct from the Eastern *Turnus*, even without knowledge of the caterpillar.

The form taken in Arizona and South Colorado differs in some respects from both the *Turnus* and *Rutulus* types. But it most resembles *Rutulus*.

1. In the shape of the tails, inasmuch as they are not spatulate, but bent inward like *Eurymedon*. The outer edge of the tail makes an arc of a circle.

2. In the absence of orange. There is none at all in either of the examples. In two ♂ ♂ from South Colorado, one is free from

orange, the other has a trifle both on the lunules and in the interspaces, thereby approaching *Turnus*.

3. The common black band before spoken of is heavy, as in *Rutulus*.

In the shape of the wings, all these males resemble *Turnus*, not being falcated. But the female, and one from South Colorado (the only ♀♀ I have seen) have the shape of *Rutulus*. I call this form *Rutulus*, var. *Arizonensis*.

There cannot be a doubt that *Turnus*, *Rutulus*, *Eurymedon*, *Daunus* and *Pilumnus* come from a common parent, but there is not the least evidence produced to show that they are not of co-ordinate value amongst themselves, or that one is derived from any other of the group. Quite the contrary. We know all about *Turnus*, at any rate. It flies from Alaska to Newfoundland, and southward to the Gulf and Texas. At the North, it has but a single generation; in the United States it has acquired a second, and in the female, dimorphism manifests itself. Now, except in difference of size, of the shade of yellow (the northern examples being pale colored), and in the definition of the black stripes and bands (the northern having these somewhat diffused, ragged-edged), *Turnus* is everywhere essentially the same. No one has thought of specifying even a variety of it. It has spatulate tails everywhere; a large orange spot at outer angle of hind wings everywhere, ♀, and considerable orange on under side. It is wonderfully true to one type for so widespread and flourishing a species. (Of course, every marking of any species will vary somewhere, and no marks are absolutely constant. Among the myriads of *Turnus* flying over a continent, individuals ought here and there to appear without a fulvous spot at outer angle, or a spatulate tail, or orange. But these would at once be set down as aberrations, as unusual and uncharacteristic.) Now, if eggs of *Turnus* produced individuals with the special characters of *Rutulus*, there would be some ground for saying that *Turnus* had come from *Rutulus*, and these exceptional examples were due to reversion. And the reverse is true. We have not yet bred *Rutulus*, but the species has been taken since the days of the Argonauts, and I have yet to hear of the first example which discovers the characters of *Turnus*. Therefore, there is no evidence that *Rutulus* has sprung from *Turnus*, and to assert that the two are, or ever were, one species is to assert what no one can possibly know.

Dr. Hagen informs me that in a series of examples, taken by him in Oregon, he can show the gradations between Papilio *Oregonia*, *Zolicaon* and *Machaon*, and he pronounces all three, besides quite a number of allied Asiatic forms of this group, to be one species only; that is, the species is *Machaon*, and all the rest are varieties thereof, and should, together with the parent (as he esteems it), be called one species. So far as concerns the American members of this group, I will venture to say that the case really stands on all fours with that of the *Turnus* group, and that these members are co-ordinate, one as near the parent stock, the progenitor of the whole of them, as another. But, suppose it should really be a case of derivation, a thing which I have seen no evidence of, and which could best be ascertained by breeding the several forms from the egg; and that *Machaon*, in course of ages, has cast off *Hippocrates*, and *Hippocrates Zolicaon*, and *Zolicaon Oregonia*. The question for us is, not what they were, nor where they came from, but what they are to-day. Are these derived forms prominent; are they permanent; do they show any signs of reversion? There is not the least evidence that they are not permanent forms, breeding true to type. Any apparent intergrades may be accounted for on the ground that they are aberrations or hybrids. Every group comprehended under a genus name has sprung from a common parent form; every sub-group, in same way, one degree further on; and when a derived form has attained the features mentioned, prominence and permanence, it is as much entitled to rank as a species as was the form from which it sprung. To claim that these independent varieties can never cast loose from the parent, and must always fly under its wing, is as if all animals bred were to be called varieties of ascidians.

Of course, this does not suit the views of the ancient school, who looked upon a species as the result of a creative act, and held it to be *teres atque rotundus* at the outset, neither to be enlarged nor diminished. And so every species was to be herded in a separate corral, the parents and all their progeny to be carefully kept together. If one of the latter, no matter whether of the half-blood or the sixteenth, jumped the fence, there was as great a hue and cry as used to be made for a runaway slave. 1863 settled the status of this last individual, and 1861 that of the other. The corral is open henceforth, and any capable variety may lawfully aspire to be a species. "The race is to the strong," literally. Let us hear Prof. Owen: "I apprehend that few naturalists now-a-days, in describing and proposing a name for what they call a new species, use that term to signify what was meant by it 20 or 30 years ago. . . . The proposer of the new species now intends to state no more than he actually knows; as, for example, that the differences on which he founds his specific character are constant in individuals of both sexes, so far as observation has reached," etc. That is all we can know of such things as dried butterflies, and to assume that a new form, because it has a certain resemblance to some other named one, must necessarily be a variety of that one, is unwarranted. If the amount of difference is important, the new form has its rights as a species, at least till the contrary is actually proved; and that can only be done by breeding from the egg.

CALLIDRYAS EUBULE. Linn.

Mr. Morrison had written that he found a species of Callidryas on Mount Graham, at an elevation of more than 10,000 feet, which seemed to him extraordinary for so tropical a genus as this—as indeed it was. One ♂, one ♀, are received. The ♂ is undistinguishable in size, color and marks from many *Eubule* of the Southern States; viz, those with no marks whatever on the under side save the very small discal spots. But the female is *white*. Now, I find nothing in the books of a white female of *Eubule*. Mr. Butler, in his monograph of Callidryas, says nothing of such a form. Mr. Morrison writes that he took but four examples of both sexes, by reason of their wild flight. This female is size of the ♂, color white with a slight green tint; the costa of primaries edged pale black; the hind margins of same wings also edged pale black, but more decidedly than costa, and the inner side of it crenated. Secondaries have a narrow macular blackish border; primaries have a rounded discal spot or patch, blackish, with a buff streak through it on the arc of cell. On the under side there is almost a complete absence of streaks or patches, but still there can be made out enough scales to show that there is a likeness to ♀ *Eubule* of the normal type. The arrangement is similar. So are the discal spots of both wings like those of ♀ *Eubule*. I have several examples of the nearly allied species C. *Sennæ*, and on the under side, every one of the females has very large discal spots, and distinct streaks and patches of pink-brown scales. So that this Arizona female does not resemble the *Sennæ* under view on the under side. But on the upper side, it more closely resembles *Sennæ* ♀ than *Eubule* ♀, in the marginal and costal edgings especially. The discal spot of primaries is rather *Eubule* than *Sennæ*, the spot on this last species being much larger than in *Eubule*.

ARGYNNIS NAUSICAA. Edw.

This fine species—size of *Aphrodite*, and belonging to same sub-group—was described in Trans. A. E. Soc., Vol. V., 104, 1875, from one ♂ two ♀, taken by Mr. Henshaw, at Rocky Cañon, Arizona, 1874. Up to the present time, no other examples have been brought in, so far as I am aware. I have from Mr. Morrison three ♂ four ♀, and have seen one ♂ one ♀, sent to Mr. Neumoegen from same collection. I have been asked wherein this species differs from *Halcyone*, Edw. This latter, in the ♂, is figured in Vol. I But. N. A., but the ♀ was unknown at the time that plate was drawn. Later, Mr. Morrison brought back both sexes from South Colorado. It belongs to another sub-group, standing near *Coronis*, Behr. A conspicuous difference will be seen in the discal row of silver spots—in *Halcyone*, *Callippe* *Coronis*, *Edwardsii*, these being large and egg-shaped. They are very noticeable. *Liliana*, H. Edw., is another of this sub-group, with still larger silvered spots. But in *Nausicaa*, these spots are small, narrow and elongated, entirely different from the great egg-shaped spots of the other. In color of upper side, *Halcyone* in both sexes is yellow-fulvous, *Nausicaa* deep red. Mr. Doll, in 1881, took no Argynnis in South Arizona, and the present species is the only one of the genus taken by Mr. Morrison, so that probably it is the most southern of all American Argynnids in its habitat. North-east Arizona, in the White Mountains, contains other species, as *Nokomis* and *Nitocris*, we know, but Colorado is the metropolis of the Argynnids.

LIMENITIS URSULA, var. ARIZONENSIS. Edw.

Attention was called to this peculiar form in "PAPILIO" 2, 22, 1882, and all the examples of *Ursula* taken by Mr. Morrison were of this type.

APATURA ANTONIA Edw. var. MONTIS.

Of this form I received 3 ♂ 3 ♀. *Antonia* was described, 1877, *Field and Forest* III., 103, from Texan examples of the low country. They were yellowish-brown, ♂, the ♀ more decidedly yellow; under side pale gray, and gray-brown. The Arizona examples (Colorado also) are fulvous above; bluish-gray beneath, but in other points they agree with *Antonia*. This species has usually three ocelli on fore wings above; beneath three, four, and even five. The upper two ocelli have the black pupils nearly occupied by large white patches. Both *Celtis* and *Alicia* have one large black and blind ocellus, in the second median interspace. But *Antonia* has another, just as large, in the upper median interspace, and both are pupilled, sometimes both with white, sometimes the upper one white the other blue, sometimes both blue. Under side, in var. *Montis*, bluish-gray over costal and hind margins and apical area, of primaries and the whole of secondaries ♂, except that the lines of the latter are brown and a nebulous brownish band crosses the wing anterior to and partly enveloping the ocelli; no white on this wing; the inner margin of primaries is fawn-color, and so is all the cell except for a gray edging to sub-costal; the spots in middle of cell are just as in *Celtis*, a small one lying against sub-costal, a larger one next median below the other, and the two are separated by a space equal to the length of the upper spot. The female has the area of secondaries outside the ocelli blue-gray with a pink tint, and the rest of the wing, from base to ocelli, is pale fuscous with a wash of gray; so that there is a striking contrast between the disk and the marginal area in color; no white whatever on this wing. Mr. Edgar A. Dodge sent me a male of this var. *Montis*, taken last summer at Boulder, Colorado, and says it was not uncommon in ravines. No doubt this form has been confounded with *Celtis* of the Eastern States, but the number of ocelli on forewings is a sufficient distinguishing character, apart from coloration.

A. Leilia, Edw., inhabits So. Arizona, and Mr. Doll brought home many specimens in 1881, also a few *Antonia*, of which I have 2 ♀ before me. They are like the Texan examples, lighter colored than those from Mt. Graham. One has 4 ocelli in each of forewings; the other has 4 above, 5 below.

On the other hand, all of Mr. Morrison's are *Antonia*, var. *Montis*. *Leilia* is represented in But. N. A., vol. II, in as perfect a figure as can be made, and as *Celtis* is on same plate the distinction between the two is patent. But as all collectors are not familiar with that plate, I will say that *Leilia* ♂ has a greatly produced anal angle and two rows of clear white spots on forewings; three ocelli in same as in *Antonia*. On the under side of primaries, the inner margin and cell are chestnut-red. The two spots in cell of *Celtis* and *Antonia* are represented in *Leilia* by a band across whole cell, and between this and the band on arc is a pure white space. All this is very different from either of the species named, and is enough to distinguish *Leilia* at a glance.

PAPHIA.—Six examples were received of a species distinct from the one found in the Mississippi Valley, *Glycerium*, Edw., not Doubleday. (Mr. Scudder, by-the-way, afterwards named this *Andria;* but I am satisfied it is *Troglodyta*, Fab. In this Mr. Butler coincides with me). I sent an example of the Arizona form to Mr. Butler, and he writes me that no such insect is in the Br. Mus. collection, nor has been described to his knowledge. I call it Paphia *Morrisonii*, and will describe it in a subsequent number of PAPILIO.

THECLA LÆTA, Edw., But. N. A., vol. I. p. 141, pl. 47.

I was much surprised at finding *Læta* in the collection, and I learn that about 30 examples were taken. Hitherto single individuals of this beautiful species have been found in Pr. Quebec, in Ontario, Maine, Catskills of N. Y.; at White Sulphur, W. Va., and at Coalburgh, W. Va. It has remained till now the rarest of our Theclas. In 18 years, I remember to have seen only 3 examples at Coalburgh. But in Arizona, we seem to have found its true home. And it is wonderful, when we come to think of it, that a delicate butterfly, expanding scarcely more than one inch, should have found its way through the whole series of States, even into Canada. It has not changed its color or markings at all, that I can discover, with its wandering.

LYCAENA PSEUDARGIOLUS. Bd.

This is a delicate and small species also, and it is found from the Boreal regions to Mexico, in one phase or other, being polymorphic. But it is not a stranger like T. *Laeta*, seen here and there occasionally. It possesses the whole country, and where found is abundant. Mr. Morrison sends examples of both sexes of the form *Pseudargiolus*, and also of the winter form *Violacea*, Edw. But these last differ from any I have seen, in having the under side dark gray. I call it var. *Cinerea*.

No Lycaenæ of Groups 1, 2, 3, Edw. Cat. were taken, but 2 of Gr. 4, and the remainder, 4 in all, belong to Gr. 5.

THECLA IROIDES. Bd.

This species is near *Augustus*, Kirby, and is found on all the Pacific slope, from British Columbia to Arizona. *Augustus* flies over the Boreal regions and Eastern States. The size of these Arizona examples, the female having nearly twice the superficial area of the eastern relative, led me to think it a new species on first examination. But Mr. Morrison tells me he found fully as large examples in California.

THECLA ALCESTIS. Edw.

Described from Texas specimens sent by the late Jacob Boll. One of our largest species of the *Favonius* group. A single example was taken in Arizona. As others were brought by Mr. Morrison from So. Colorado, the species probably has its habitat more to the southward, Texas to Mexico.

Coalburgh, W. Va., November 1, 1882.

LIST OF SPECIES OF BUTTERFLIES COLLECTED IN ARIZONA BY MR. H. K. MORRISON, IN 1882

Papilio Daunus, Bd.
" Rutulus, Bd.
" " var. Arizonensis, Edw.
" Bairdii, Edw.
" Philenor, Linn.
Pieris Protodice, Bd.
" " form Vernalis, Edw.
" Sisymbri, Bd.
Nathalis Iole, Bd.
Anthocharis Stella, Edw.
" Hyantis, Edw.
Callidryas Eubule. Linn.
Colias Cæsonia, Stoll.
" Eurytheme, Bd.
" form Keewaydin, Edw.
Terias Nicippe, Cram.
" Mexicana, Bd.
Danais Archippus, Fab.
" Strigosa, Bates.
Argynnis Nausicaa, Edw.
Euptoieta Claudia, Cram.
Melitæa Gabbii, Edw.
" Leanira, Bd.
" Thekla, Edw.
" Minuta, Edw.
" Perse, Edw.
Phyciodes Pratensis, Behr.
" Mylitta, Edw.
" Picta, Edw.
Eresia Texana, Edw.
Synchloe Crocale, Edw.
Grapta Satyrus, Edw.
Vanessa Antiopa, Linn.
" Milbertii, Grote.
Pyrameis Cardui, Linn.
" Carye, Hübn.
Limenitis Ursula, var. Arizonensis, Edw.
" Eros. var. Obsoleta, Edw.
" Weidemeyerii, Edw.
Heterochroa Californica, Butl.
Apatura Antonia, Edw., var. Montis.
Paphia Morrisonii, Edw.
Neonympha Rubricata, Edw.
" Henshawi, Edw.
Libythea Carinenta, Cram.
Lemonias Cythera, Edw.
" Nais, Edw.
" Palmerii, Edw.
" Ares, Edw.
" Cleis, Edw.
Charis Nemesis, Edw.
Thecla Halesus, Cram.
Thecla Alcestis. Edw.
" Melinus, Hübn.
" Apama, Edw.
" Leda, Edw.
" Iroides, Bd.
" Læta, Edw.
Lycæna Acmon West.-Hew.
" Pseudargiolus, Bd.
" " Violacea-Cinerea, Edw.
" Amyntula, Bd.
" Alce, Edw.
" Exilis, Bd.
" Marina, Reak.
Copæodes Procris, Edw.
" Myrtis, Edw.
Thymelicus Hylax, Edw.

Pamphila Taxilis, Edw.
" Comma v. Colorado, Scud.
" " v. Nevada Scud.
" Snowi, Edw.
" Phylæus, Dru.
" Deva, Edw.
" Python, Edw.
" Pittacus, Edw.
" Nereus, Edw.
Amblyscirtes Ænus, Edw.
" Nanno, Edw.
Pyrgus Tessellata, Scud.
" Scriptura, Bd.
Thanaos Brizo., Bd.
" Icelus, Lintn.
" Ausonius, Lintn.
" Propertius, Lintn.
" Pacuvius, Lintn.
Thanaos Afranius, Lintn
" Tatius, Edw.
" Clitus, Edw.
" Funeralis, Lintn.
Pholisora Catullus, Cram.
" Pirus, Edw.
" Alpheus, Edw.
" Ceos, Edw.
Eudamus Pylades, Scud.
" Nevada, Scud.
" Moschus, Edw.
" Epigena, Butl.
" Hippalus, Edw.
" Cellus, Bd.
" Tityrus, Fab.
" Dorus, Edw.
Pyrrhopyga Araxes, Hew.

DESCRIPTIONS OF NOCTUID LARVÆ FOUND ON CUTTS' ISLAND, MAINE.

By Roland Thaxter;

PSEUDOTHYATIRA CYMATOPHOROIDES. *Guen.*

Rich yellow-brown, varying in shade, mottled by fine dark lines. A contrasting white spot just above the stigmata of seg. 4, roundish and varying in size, sometimes altogether wanting. A fine, continuous black dorsal line. Head protruded and darker brown than the body. Stigmata black-brown, slender. L. 42 m. m. Three specimens found in cases between leaves, such as are made by *Charadra.* When at rest the body is bent, the head approaching the posterior segments. Spun a slight cocoon in moss September 20-25. Imago June 9 P. M.

Three specimens on red oak.

HABROSYNE SCRIPTA. *Gosse.*

Eggs somewhat pear-shaped, white, changing to bright pink after a day or so of exposure to the air, deposited transversely, singly or superposed in chains of five or six, on the margins or ribs only of raspberry leaves, July 21. A number of hair-like scales are also deposited with the eggs.

Mature larva.—Rich yellow-brown, often almost black. A distinct dorsal black line. Lateral portions more yellow, with blackish mottlings, and broken by blackish dashes which extend from the dorsal portions anteriorly and inferiorly, becoming pointed about the stigmata, where they end. Dorsal surface generally much darker than the rest of the body, though subject to considerable variation. In a few specimens one, two or even three white spots were present above and somewhat anterior to the stigmata on the fourth, fifth or sixth segments respectively; each spot having a central black dot. In some specimens a white spot was present just below the stigmata of seg. 3, also a smaller lateral spot on seg. 1. Segments 2 and 3 are somewhat larger, and seg. 1 somewhat smaller than the rest. Head yellow-mottled with dark brown, the mottling contrasting. Beneath, dirty yellow, smooth, cylindrical, tapering posteriorly. Head prominent, moderate. Cocoon in moss, very slight, August 27, Pupa legs, 1. When at rest the larva rests either like a Notodontian, the anterior and posterior portions of the body being elevated, or bent so that the head rests upon the posterior segments. When not feeding the larva conceals itself in a case formed by curling down the edge of a leaf, as in the preceding species. Length 30 m. m.

I was unable to observe the early stages and only noted that the first was pinkish, without marks, and that in the stage before the last moult the larva closely resembled *Notodonta stragula* in its early moults.

PLATYCERURA FURCILLA. *Pack.*

Mr. Lintner has described the more common brown form of this larva in his Entomological Contributions, and the following is a description of a second form, which differs so markedly from that described by Mr. Lintner that I have, until very recently, considered it to belong to another species. Imagos, however, reared last summer from both forms show no constant variation.

The normal form is light chestnut-brown, with tufts of hair of the same color, the larger pencils on segs. 1, 2, 4, 11, deep chestnut, tipped with black. In the present dimorphic form the color is glossy black, growing dull and tinged with green, as the larva matures. Sparsely clothed with tufts of white hairs of about twelve tufts on each segment, except the first and last. These tufts are small and the hairs are of irregular length. On segs. 1, 2, 4, 11 are set pairs of sub-dorsal tufts, as in the normal form, but clear white or tinged with olive. There is a lateral row of whitish spots extending superiorly and anteriorly just below the stigmata, which are greenish-white. Otherwise the larva is without marks. Head shining black, clothed with a few hairs and with two indistinct whitish frontal streaks. Legs and prolegs light brown, moderately short, tapering posteriorly. Rests extended on a twig, with the head drawn down so that its frontal surface is parallel to the twig. Spins a double cocoon much like *Charadra*, in September (9th to 25th), the imago appearing in June and July. Feeds on white pine.

A similar larva was found on Linden, September 15, indicating a great variety in the food plant. The larva, when young, fed only upon the margins of the leaves.

CHARADRA DERIDENS. *Guen.*

Eggs on red oak July 4, flattened, ribbed, whitish, deposited singly or in rows on under side of leaf. Hatched July 11.

Young larva. Light green. On segments 2, 3, 4, 5, 6, respectively, a large, roundish, red sub-dorsal spot. Head large, tinged with brown. Body tapering considerably posteriorly and sparingly clothed with long colorless hairs. L. 2.5 m. m.

After 1st moult, July 14. Color light green, white externally. The red spots much darker, smaller anteriorly. A white dorsal line, with indications of sub-dorsal ones. Hairs on segs. 1, 10, 11 longer than the rest. L. 5 m. m.

After 2d moult, July 19. Color as before. Dorsal, sub-dorsal and two lateral white lines. The red spots, dark wine-colored, and replaced on segs. 2 and 3 by tufts of short blackish hairs somewhat below the sub-dorsal line. Several long black hairs on segment 1, which protrudes laterally beyond the head. L. 8 m. m.

After 3d moult, July 23. Bluish green. Lines more distinct. The spots on 4, 5 and 6 smaller and blackish. Hairs composing the dorsal tufts, except those on seg. 1, 10 and 11 short; lateral tufts long (this applies to all stages). A lateral tuft of long black hairs on seg. 1. Head straw colored, edged externally with black, having a broad posterior black band from which two fine black lines diverge to the jaws. Legs and prolegs bluish-green. L. 11 m. m.

After 4th moult, July 26th. Very light bluish-green. Sub-dorsal spots minute. Head variously marked with black, light-green or straw color. Else as in the two preceding stages. L. 18 m. m.

After 5th moult, July 30. Much as before; the sub-dorsal spots hardly visible. In some specimens large suffused dorsal, dirty blackish patches.

After 6th and last moult, August 6. Every variety of color from clear blue-green to black or dirty brown. Sub-dorsal spots absent. Longitudinal streaks indistinct. Tufting as before; hairs slender, not stiff, white. A few lateral black hairs on seg. 1. Head variously marked from shining black with a few straw colored frontal spots to light straw color. L. 40-60 m. m. Cocoon August 15.

Concealed in a case between two leaves. Rests with the body unbent. The same larva was found on birch and elm. The mature larva has been described by Mr. Sanders in Can. Ent., Vol. 1.

The larva of *C. propinquilinea*, which feeds on birch, walnut, maple and oak, is subject to a somewhat similar variation. One specimen found on maple at Mt. Desert, Me., was black, with a dorsal white band, and a lateral white band edged below with black. Beneath white. The long tufts on seg. 2 were clear black instead of red as normally. Other specimens on walnut were mottled with black.

C. deridens spins a close outer cocoon of fine pinkish silk and a coarse inner cocoon of brown silk. Imago in June and July.

RAPHIA FRATER. *Grote.*

Color generally dark, somewhat bluish-green, though subject to considerable variation of tint. Body covered with scattered bright yellow points, about twenty on each segment. A dorsal hump on seg. 2 surmounted by two short, blunt red prominences. On the dorsal surface of segs. 4, 8, 11 is a transverse mottled red-purple transverse band, interrupted centrally and somewhat crescent-shaped, which is bordered posteriorly and externally with more or less clear yellow. A lateral red point on segs. 1 and 2. Legs and prolegs light green, anal pair tipped with red. Head rather large, bluish-green, with minute lateral black point. . L. 40 m. m.

Form very stout, tapering somewhat posteriorly and ending abruptly. Rests on the midrib on the under side of poplar leaves. Varies considerably in size, the males being much smaller and more slender than the females.

Spun a stout blackish cocoon on bark September 10. Imago June 10.

It is this larva or its ally, *R. abrupta*, that is figured in Harris' Correspondence, pl. 1, fig. 6. as "*Notodonta* sp., found under maple."

APATELA MORULA. *G. & R.*

Eggs on elm, July 6. Very small, much flattened, whitish. Hatched July 12.

Young larva.—Dirty greenish-white, without marks. A few white hairs, a sub-dorsal row black. Head tinged with brown.

After 1st moult, July 15. Light green. Legs and setiferous tubercles white. A sub-dorsal white band. A few anterior and posterior hairs very long. Head light green, with a few longitudinal dark streaks. L. 2.5 m. m.

After 2d moult, July 19. Brighter green. Sub-dorsal band more distinct, interrupted on segs. 1 and 10. A transverse median dorsal red band on segs. 4, 7, 11. Form more tapering abruptly anteriorly and gradually posteriorly from segs. 3 and 4. L. 6 m. m.

After 3d moult, July 22. Clear, light pea-green. A sub-dorsal yellow band growing faint on segs. 9 and 10. A conspicuous mottled dark red-brown dorsal patch on segs. 4, 7, 11, edged posteriorly and externally with yellow. A fine lateral white line. Two small dorsal reddish patches on seg. 1. Setiferous tubercles yellowish, bearing a few long whitish hairs. Head green anteriorly, mottled reddish posteriorly. Legs and prolegs green. L. 10 m. m.

After 4th moult, July 26. Dark yellow-green above, blue-green below. Colors brighter than in the preceding stage. Lateral line broken and inconspicuous, otherwise as in the preceding stage. L. 18 m. m.

After 5th moult, July 29. Colors more intense, the yellow and red of the dorsal spots contrasting strongly. In a few specimens seg. 8 has in all the above stages a dorsal spot less conspicuous than the rest, otherwise as in 5th stage. L. 30 m. m.

After 6th and last moult, August 2. (Mature larva). General color mottled-brown and greenish like bark. A dorsal black band contracted between each segment, containing a central dorsal white line. On segs. 4, 7, 8 this band forms a transverse dorsal hump edged with deep black and set with a few short white hairs. Above and below the stigmata are white, setiferous tubercles bearing whitish hairs. Segs. 1, 2 and 3 are set with tubercles bearing longer hairs than the others, which are directed anteriorly. A diagonal black mark suffused on segs. 1, 2, 3 runs superiorly and posteriorly just above the stigmata. Stigmata black, ringed with white. Head black anteriorly, dull carmine or orange posteriorly, with a central, arrow-shaped light brownish mark, and with several lateral whitish streaks. Legs greenish. Prolegs black. Beneath dirty greenish. L. 50 m. m.

This last moult is somewhat interesting, as with its change of color a corresponding change of habit supervenes and the larva, instead of resting on the upper surface of the leaves on which it spins a slight web, as in the preceding stages, betakes itself to the crevices of the bark, when it becomes almost invisible.

The black and brown tints do not appear immediately after the last moult and the larva differs little from the preceding stage till it has been exposed to the air for some time, the dark tints gradually appearing after several days. The same is the case in *A. furcifera* and *lobeliæ* and also in *Thyreus abbotii*, the early stages of all these being adapted to leaves, the last to bark.

In their early stages the larvæ of *A. morula*, *furcifera*, *Radcliffii*, and *clarescens* can hardly be distinguished at a glance, and all, except the last species, produce striking changes of color after the last moult.

The cocoon of *morula* is spun under loose bark or in the crevices, and can often be found on the trunks of old elms, though I have found the moth somewhat rare. The present brood began to spin August 9, producing a single imago September 7. The remaining cocoons will hybernate. The moth appears in June and July. The same larva was found on linden September 15.

APATELA VULPINA. *Grote.*

Before last moult. Body greenish-white, darker inferiorly, thickly clothed with long white hairs, slightly tinged with yellow. A jet black, rather short, thick black tuft on the median dorsal portion of segs. 4, 6, 7, 8 and 11. Head light greenish with a black dot on the frontal portion, each side of the median line, also two inferior black spots. Legs light green, prolegs banded with black. L. 30 m. m.

Mature larva.—Body light bluish-green, whitish above, immaculate and without any black dorsal tufts. Thickly covered with tufts of long, curved yellowish-white hairs. A few short black hairs on 11 and 12. Head large, dirty-whitish, with a few darker mottlings, and two inferior black spots on either side. Stigmata yellow. L. 45.

Entered the earth September 9, where it spun a slight cocoon, changing to a somewhat slender olive-tinted pupa. Imago June 26, 11.30 A. M.

The long curved hairs give this larva a very curious appearance when at rest on the under side of a leaf, with its body curved about so as to form what appears to be an oval mass of down that is readily mistaken for a nest of spiders' eggs. The curved hairs seem to come to a sort of focus in the region of segment 9, which is very characteristic. Before entering the ground the body becomes dirty brownish-green, the hairs become dirty yellow, the head entirely black, without marks. Found on poplar and birch. This is the only species of *Apatela*, as far as I know, the larva of which enters the earth to spin its cocoon. A second specimen, to which no earth was given after it had changed its color preliminary to transforming, refused to spin a cocoon with bits of bark and other substances furnished for the purpose, and finally died, as it seems, for lack of earth to enter. This larva resembles very closely, in both the stages above described, the corresponding stages of the European *Apatela leporina*, but the mature larva of *vulpina* differs by the absence of any dorsal marks and, probably, in some other points. The pure white color of the imago is, doubtless, protective, and connected with the white color of the bark of its second food plant.

APATELA NOCTIVAGA. *Grote.*

Eggs on poplar, July 14. Hatched July 9. Young larva. Color greenish-white. Dorsal portions of segs. 1, 4, 7, 8 and 11 red; the rest more or less tinged with red. Sparsely clothed with long blackish hairs. Beneath greenish-white. Head brown, rather stout, not tapering. L. 3 m. m.

After 1st moult, July 12. Color dirty greenish. Segmentation very distinctly marked. Dorsal patches dull reddish on superior portion, the other segments (except 9 and 10) suffused with red. Head dirty red, greenish anteriorly. Somewhat thickly covered with tufts of stout black hairs. L. 5.5 m. m.

After 2d moult, July 12. Much darker than before, the red colors having become dark wine-color, somewhat mottled, and being suffused over the dorsal portion of all the segments, except 9 and 10. Sub-lateral and ventral portions light green, except on segs. 1, 2 and 3, which are tinged with red. A whitish lateral line. Body covered with black setiferous warts, on which are set thick tufts of short stout black hairs, those on seg. 10 much shorter than the rest. Legs green, edged with red. Prolegs banded, green and red. Head dark blackish, mottled, tapering gradually posteriorly and suddenly anteriorly from seg. 11. L. 8 m. m.

After 3d moult, July 20. Dull black above, yellowish beneath. A yellowish lateral line. Two yellowish dorsal patches on seg. 10, on which the hairs are short. Head blackish, with an anterior yellowish V-shaped mark. Legs greenish-yellow. Prolegs blackish. Seg. 11 much hunched. Form stout, much hunched in the region of segs. 2-4. L. 10 m. m.

After 4th moult, July 24. Black above, deeper anteriorly. A distinct yellow lateral band beginning on seg. 4 and running just below the stigmata, which are white, contrasting. Feet yellow. Prolegs black. Dorsal patches on 10 brighter, otherwise as in preceding stage. In some specimens the tufts on the segs. posterior to 3 and anterior to 11 are light smoky-brown, this peculiarity continuing through the last stage. (A similar variety occurs in the case of *A. luteicoma*, *Grote*.) L. 13 m. m.

After 5th moult, July 28. Lateral band orange colored. A broken yellowish stripe at base of legs. Two dorsal orange spots on 10, and in some specimens two smaller spots on 9. L. 19 m. m.

After 5th and last moult, August 1. Much as before, the setiferous tubercles large and rough, jet black, bearing thick tufts of short, stiff black hairs. Lateral band and dorsal spots dark red. Head and prolegs shining black. (Form as in *A. brumosa*, *Guen.*) L. 30 m. m. Cocoon between leaves August 9. Imago in May and June.

Although the moth is by no means rare, I have never before seen this larva during ten years collecting, although from its habits and color it is very conspicuous when feeding.

APATELA LUTEICOMA. *G. & R.*

Mature larva.—Blackish, with a reddish lateral band, as in the preceding species, though less distinct. Head shining black, with a few whitish hairs. Prolegs black. The tufting is somewhat peculiar. From the dorsal portion of 4 and placed transversely, project four very thick, smoky-black tufts of fine hair, and externally to these is a small, clear white tuft of similar hair. From the dorsal portion of seg 11, which is much hunched, project two long tufts of similar black hairs and externally to these are placed two white tufts, one on each side, as on seg. 4. On seg. 5 are six tufts, placed transversely on the dorsal surface, of similar fine white hairs. On seg. 3 are four similar tufts and also one each (sub-dorsal) on segs. 8 and 9. The four dorsal tufts of 2 also have a few of the fine white hairs at their bases. All the tufts above mentioned have a few longer, coarse black hairs mingled with the finer ones. On segs. 6-10, inclusive, four reddish tubercles placed transversely on the dorsal surface from the edges of which project a few short whitish hairs, and from the central portions a few stout, short black hairs. There are two similar tufts on the anal segment. The remaining tufts are composed of long whitish hairs, very thickly set on the anterior segments and projecting forwards over head on seg. 1. Form stout, shape much as in the preceding species. L. 40 m. m. Cocoon between leaves or in rotten bark. Found in September on apple, cherry, walnut, oak, linden and ash. Easily recognized by the peculiar tufts. Rests by day on the trunk of its food plant.

APATELA AFFLICTA. *Grote.*

Mature larva. Light yellow-brown, tinged with green, darker superiorly. A few lateral whitish hairs. Stigmata white, ringed with black. A whitish stigmatal line; a distinct, continuous black dorsal line. A sub-dorsal row of stiff club-shaped hairs, such as are found in the larva of *A. funeralis*, but much smaller and not noticeable. These are easily broken and in the specimen before me are present only on segs. 4, 5, 6 and 11, though in more perfect specimens they may occur on all the segments. One specimen found was rich yellow-green, and all vary considerably in shade. Head yellow-brown, lighter externally, sparsely clothed with whitish hairs. Form stout, flattened posteriorly. Rests with head touching the posterior segments, selecting a withered or discolored leaf on which it is well concealed. Cocoon stout, elongated, spun among bark. Several specimens on red oak. Cocoon also under walnut. Spun September 17-25. Imago, June and July.

Of the species of *Apatela*, I am familiar with the larva of the following:

Vinnula, *occidentalis* and *morula* on elm; *lobeliæ* on oak; *furcifera* on wild cherry; *Radcliffei* on wild cherry and apple; *funeralis* on hickory; *vulpina* on poplar and birch; *Americana*, maple, oak, walnut, linden, ash, sycamore; *dactylina*, alder and willow; *luteicoma*, linden, ash, maple, cherry, apple, walnut, oak; *brumosa*, birch, willow, poplar; *noctivaga*, poplar; *afflicta*, oak, hickory (?); *clarescens*, apple, cherry; *hamamelis*, oak, chestnut; *xyliniformis* birch, blackberry; *oblinita*, button bush and various meadow plants; *lanceolaria*, a green larva, probably eating weeds, such as plantain, etc., found under a board at Cp. Neddock.

MAMESTRA GRANDIS. *Led.*

Mature larva.—Dull purplish, with obscure black and white mottling. Dull greenish ventrally. A broad, ill-defined light lateral band; an obscure dorsal streak and sub-dorsal lines. Four dorsal black spots on each segment, except 1-3 the anterior pair being more closely approximated than the posterior. A dark anterior shield on seg. 1· as in *Hadena*. Head light shining brown, somewhat mottled. Legs and prolegs dull greenish, the latter tipped with brown. A few short yellowish hairs on head and body. L. 40 m. m. From eggs laid on burdock in July. Entered earth August 19.

PLUSIA CONTEXTA. *Grote.*

Eggs on grass, July 10. Somewhat flattened, much larger than those of *precationis*, *ampla* and similar species, somewhat flattened, greenish-yellow. Hatched July 16.

Young larva —Light grass-green, on each segment are two transverse rows of large black warts, those of one row alternating with those of the other. From each of these warts projects a stout, curved black hair. Head light brown, mottled with black, and with a few black setiferous warts. Prolegs blackish, very slender. L. 4.5 m. m.

Before preparing for the first moult a row of dull scarlet spots appear, anterior to and including the sub-dorsal row of setiferous tubercles on all the segments, except 1 and 11.

After 1st moult, July 20. Color as before. A white lateral and faint sub-lateral streak. Setiferous warts less distinct. Head with a few black setiferous tubercles. The red spots appeared as before, though less distinct. L. 9 m. m.

After 2d moult, July 20. Darker green. Two dorsal and one sub-dorsal white streak. A clear lateral white band. Setiferous tubercles less distinct, neither they nor the hairs they bear seem to increase after the first stage. Red spots before moulting scarcely visible. L. 14 m. m.

After 3d moult, July 25. Lateral band distinct cream-colored. Two dorsal and and two sub-dorsal whitish streaks. The setiferous tubercles very small, only those on the head, the first three segments, together with a row situated just above the lateral line, are black. A semi-circular lateral row of black spots on head. L. 26 m. m.

After 4th moult, July 28. Lateral band more yellow. Dorsal ones more distinct. Indications of suffused dorsal yellow patches. Else as before. L. 30 m. m.

After 5th moult, July 31. Mature larva. Color light grass-green, darker inferiorly. A contrasting, creamy-yellow lateral band. Two dorsal and two sub-dorsal cream-colored lines, the former more distinct. A dull yellow, suffused dorsal patch, more or less distinct in different specimens, sometimes wanting on posterior 7 and anterior 8, extending nearly to the lateral line. A similar suffused spot is sometimes found on seg. 9, 10. Head green, with a few minute points and hairs. Slender, somewhat flattened. L. 45 m. m. Spun a slender, elongated white cocoon, pointed at both ends, August 4, changing to a pupa August 6, and producing the imago August 17, a period of thirty-eight days and a few hours, the eggs having been laid during the evening of July 10.

A brood of *Plusia Putnami*, *ampla* and *Epigæa* were brought through the third moult, but all died before completing the fourth moult, except a few *Putnami*, which, at this stage could not be distinguished from *contexta*, unless, perhaps, by a slight, blackish dorsal shade. Their death seemed to be the result of two causes—bleeding through the rupture of the integument while shedding the skin, probably the result of too much moisture, and blackening, probably caused by some *fungus*. I have been somewhat troubled by entomophthrous fungi in rearing moths, especially by a species of *Entomophthura* allied to *radicans*, which attacks hairy caterpillars with great rapidity while feeding. Another mold has recently almost wholly destroyed a brood of *Ichthyura*, portions of the body blacking and producing a white mycelium, while the larvæ were still living, though unable to eat. I have not met with the species of *Torrubia*, except in the supposed conidial form. In addition to these I have found several species of *Mucor* and *Penicillium* very destructive among winter pupæ.

Of the Plusia above described, about ten imagos were obtained from a brood of several hundred. There are probably three or four broods of this species in a season, though there is little or no regularity in the appearance of the imago, as both this species and *Putnami* may be met with at any time from June to the middle of September. It is probable that a portion at least of the July broods of Plusia hibernate with the August and September broods, as the only survivor of my brood of *ampla* became torpid after the fourth moult and continued in this condition till the first of October, when it died. The following is a list of the species of Plusia that I have taken in this locality. P. *purpurigera*, *æreoides*, *ærea*, *balluca*, *contexta*, *Putnami*, *formosa*, *mappa* (Isles of Shoals) *biloba*, *verruca*, *Dyaus*, *precationis*, *laticlavia*, *u. aureum* (?), 8-*scripta*, *viridisignata*, *oxygramma*, *mortuorum*, *epigaea*, *ampla*, *simplex*.

NOTES ON THE GENUS CLISIOCAMPA.

By R. H. Stretch.

When at Astoria, Oregon, on the 17th of June last, I found the larvæ of two species of *Clisiocampa* infesting the orchards at that place, one of them excessively abundant the other in much smaller numbers. As we were traveling very rapidly and I had no opportunity for a week to examine and feed the larvæ I only succeeded in raising one of the species, and of that but few perfect specimens. I here give such notes as I have of their transformations.

Larva No. 1.—Similar to that of *C. Californica* in size and general appearance, but strikingly brighter colored. Length 1¼ to 1¾ inches. Dark brownish-black. Prolegs black; abdominal legs pale tawny at tips. Sides mottled with yellow, gathered into a broken lateral line along the upper edge of the yellow markings. Median dorsal line black, sometimes with a narrow, broken bluish line centrally, and a few spots of the same color just above the lateral yellow line on each segment. On each side of the blue dorsal line there is a mottled broken band of bright tawny yellow, the color most concentrated on the posterior part of each segment, thinly clad with pale tawny hairs. Beneath black, mottled with pale bluish-grey.

Varies by the expansion of the dorsal yellow markings so as to be strikingly yellow, or by their contraction so as to appear nearly blackish-brown. In this last case the blue markings become strikingly visible.

This species was only met with at Astoria, though diligent search was made for it at Portland and elsewhere. It was found feeding on the cherry, apple, currant, bramble and rose. A few on plum trees and on a tree allied to the hawthorn, none on the pear. It was most abundant in a badly-tended orchard; much less common in the one adjacent, where the plastering of the tree trunks with lime showed greater care and attention. The absence of larvæ in the same locality on July 31, shows the species to be probably single brooded.

The nests were long and narrow, very compactly and closely woven outside, so as almost to resemble a thin silken bag. Length about 12 inches, with a diameter of about 1.5 to 3 inches.

Larva No. 2.—Associated with the preceding on the apple trees, and found on the pear at Astoria, and cherry at Portland, a single larva being also found in the sweeping net at Yakima City, was a second very distinct form of which the following is a description.

A broad velvety-black dorsal line, narrowly edged with tawny, enclosing a few parallel tawny broken lines, and a dirty white ovate spot on the anterior part of each segment, those nearest the head being narrower than the others. Sides bluish-slate, palest above the feet, divided by a tawny lateral line, very faintly edged above and below with black. Prolegs black; abdominal legs slaty. Beneath slaty, with a large sooty-black spot on each segment on the dorsal line, those on the central segments being most conspicuous. A few short tawny hairs.

This species I unfortunately failed to rear, of No. 1 I raised two perfect ♂, and many cripples. Not having the types of *erosa* before me I cannot say if No 1 may be the larva of that species or not, but have forwarded the male to Mr. H. Edwards, who possesses the types of *erosa*, for comparison.*

San Francisco, August 9, 1882.

---

* The male alluded to by Mr. Stretch was certainly not his *Erosa*, but appears to me to be a new species. In this genus it is exceedingly difficult to distinguish the imagos.—Hy. Edwards.

LIST OF NOCTUIDÆ TAKEN IN ORONO, MAINE, AND VICINITY.

By Mrs. C. H. Fernald.

Leptina Doubledayi, Guen. rare.
Pseudothyatira cymataphoroides, Guen.
“ var. expultrix, Gr.
Habrosyne scripta. Gosse. rare.
Audela acronyctoides, Walk. (1 ex.)
Charadra propinquilinea, G. 1 ex.
“ deridens, Guen. rare.
Raphia frater, Gr.
Feralia jocosa, Guen. very rare.
Diphthera fallax, H-S. rare.
Apatela vinnula, Gr.
“ grisea, Walk. rare.
“ occidentalis, G. & R.
“ lobeliæ, Guen,
“ morula, G. & R.
“ Radcliffei, Harv. rare.
“ innotata, Guen.
“ Americana, Harr,
“ dactylina, Gr.
“ luteicoma, G. & R. rare,
“ brumosa, Guen.
“ noctivaga, Gr.
“ superans, Guen.
“ clarescens, Guen.
“ hamamelis, Guen. rare.
“ haesitata, Gr. very rare.
“ dissecta, G. & R.
“ sperata, Gr,
“ oblinita. A. & S.
“ lithospila, Gr. rare.
Arsilonche henrici, Gr.
“ var, evanidum, Gr. (1 ex.)
Harrisimemna trisignata, Walk.
Microcoelia fragilis, Guen.
“ obliterata, Gr.
Bryophila lepidula, Gr. rare.
Chytonix palliatricula, Guen. rare.
Agrotis chardinyi, Boisd.
“ badicollis, Gr.
“ janualis, Gr. rare.
“ opacifrons, Gr. very rare.
“ sigmoides, Guen.
“ perattenta, Gr.
“ attenta, Gr. rare.
“ phyllophora, Gr.
“ rubifera, Gr.
“ conflua ? Gr.
“ perconflua, Gr. very rare.
“ Fishii, Gr. 2 ex.
“ baja, S. V.
“ Normaniana, Gr.
“ c-nigrum, Linn.
“ bicarnea, Guen.
“ haruspica, Gr.
“ gularis, Gr.
“ turris, Gr.

Agrotis fennica, Tausch. rare.
“ subgothica, Haw.
“ tricosa, Lintn.
“ herilis, Gr.
“ plecta, Linn.
“ cupida, Gr.
“ brunneipennis, Gr. rare.
“ alternata, Gr.
“ clandestina, Harr.
“ messoria, Harris?
“ scandens, Riley. rare.
“ atrifera, Gr. (2 ex.)
“ pitychrous, Gr.
“ versipellis, Gr. rare.
“ campestris, Gr. rare.
“ var. decolor, Morr.
“ redimicula, Morr.
“ geniculata, G. & R.
“ collaris, G. & R.
“ perpolita, Morr. very rare.
“ fumalis, Gr. rare.
“ mimallonis, Gr. rare.
“ tristicula, Morr. (only the type).
“ Fernaldi, Morr, very rare.
“ venerabilis, Walk.
“ volubilis, Harv.
“ annexa, Tr.
“ ypsilon, Rott.
“ saucia, Hübn.
“ lubricans, Guen.
“ rufipectus, Morr. rare.
“ trabalis, Gr.
“ pressa, Gr.
“ prasina, Fabr.
“ occulta, Hübn.
“ astricta, Morr. rare.
Anytus sculptus, Gr.
Pachnobia salicarum, Barnst. rare.
Fishia enthea, Gr. (2 ex.).
Mamestra purpurissata, Gr. (1ex.)
“ nimbosa, Guen. (1 ex.)
“ imbrifera, Guen.
“ latex, Guen.
“ adjuncta, Boisd.
“ lubens, Gr.
“ legitima, Gr.
“ lilacina, Harr.
“ var. illabefacta, Morr.
“ Goodellii, Gr. rare.
“ assimilis, Morr.
“ rosea, Harv. rare.
“ congermana, Morr, rare.
“ vindimialis, Guen. 2 ex.
“ picta, Harr.
“ grandis, Boisd.
“ subjuncta, G. & R.

Mamestra Atlantica, Gr.
" Dimmockii, Gr. rare.
" trifolii, Rott.
" vicina, Gr. rare.
" detracta, Walk.
" olivacea, Morr,
" lustralis, Gr. rare.
" meditata, Gr. rare.
" renigera, Steph.
" lorea, Guen,
" rugosa, Morr. very rare.
Luceria passer, Guen. rare.
" var. conspicua, Morr. (1 ex.)
Hadena ducta, Gr. very rare.
" devastatrix, Brace,
" arctica, Boisd.
" Bridghamii, G. & R, rare.
" dubitans, Walk.
" sputatrix, Gr.
" suffusa, Morr.
" apamiformis, Guen.
" vultuosa, Gr. rare.
" lignicolor, Guen.
" verbascoides, Guen.
" cariosa, Guen.
" vulgaris, G. & R.
" remissa, Hübn.
" finitima, Guen.
" impulsa, Guen.
" leucoselis, Gr. very rare.
" algeus, Gr. very rare.
" vigilans, Gr. (2 ex.)
" diversicolor, Morr.
" mactata, Guen.
" modica, Guen.
" vulgivaga, Morr.
" fractilinea, Gr.
Oligia versicolor, Gr. (1 ex.)
" arna, Guen.
Dipterygia scabriuscula, Linn.
Hyppa xylinoides, Guen.
Valeria Grotei, Morr. 1 ex.
Homohadena atrifasciata, Morr. rare.
Dryobota stigmata, Gr. rare.
Actinotia ramosula, Guen.
Conservula anodonta, Guen. (2 ex.)
Trigonophora periculosa, Guen.
" var. V-brunneum, Gr.
Euplexia lucipara, Linn.
Brotolomia iris, Gven.
Nephelodes minians, Guen.
" var. violans, Guen.
Tricholita semiaperta, Morr,
Helotropha reniformis, Gr.
" var. atra, Gr.
" sera, G. & R.
Apamea nictitans, Behr.
" var. erythrostigma, Haw.
Gortyna immanis, Gr. (1 ex.)
" iuquaesita, G. & R.

Gortyna impecuniosa, Gr. very rare.
" purpurifascia, G. & R.
" rutila, Guen. rare.
" nitela, Guen. very rare.
" var. nebris, Guen. (1 ex.)
Achatodes zeae, Harr. (2 ex.)
Sphida obliquata, G. & R. rare.
Arzama diffusa, Gr. (2 ex.)
Macronoctua onusta, Gr, very rare.
Amolita fessa, Gr. rare.
Platysenta atriciliata, Gr.
Heliophila pallens, Linn.
" albilinea, Hübn.
" amygdalina, Harv. (only type)
" phragmitidicola, Guen.
" adonea, Gr.
" commoides, Guen.
" unipuncta, Haw.
" psedargyria, Guen.
Caradrina miranda, Gr.
" multifera, Walk.
Pyrophila tragopoginis, Linn.
" pyramidoides, Guen,
Orthodes infirma, Guen.
" cynica, Guen.
" enervis, Guen. (2 ex.)
Taeniocampa thecata, Morr. rare.
" oviduca, Guen.
" incerta, Hübn.
Crocigrapha Normani. rare.
Morrisonia evicta, Gr. (1 ex.)
Anchocelis digitalis, Gr. (2 ex.)
Parastichtis perbellis, Gr.
" minuscula, Morr. rare.
Orthosia ferruginoides, Guen.
" euroa, G. & R.
Cosmia infumata, Gr. (1 ex.)
Homoglaea hircina, Morr. (2 ex.)
" carnosa, Gr. (2 ex.)
Glaea inulta, Gr.
Epiglaea sericea, Morr.
" apiata, Gr. (2 ex.)
Eucirroedia pampina, Guen.
Scoliopteryx libatrix, Linn.
Xanthia togata, Esper.
Scopelosoma Graefiana, Gr. (1 ex.)
" devia, Gr. rere.
" Morrisoni, Gr. rare.
" Walkeri, Gr. rare.
Litholomia napaea, Morr. rare.
Lithophane disposita, Morr.
" petulca, Gr. rare.
" ferrealis, Gr. rare.
" signosa, Walk. rare.
" Bethunei, G. & R.
" fagina, Morr. rare.
" Georgia, Gr. rare.
" laticinerea, Gr.
" cinerosa, Gr. very rare.
" unimoda, Lintn. very rare.

Lithophane tepida, Gr. rare.
“ lepida, Lintn. (1 ex.)
“ pexata, Gr.
“ Thaxteri, Gr. rare.
Lithomia germana, Morr. rare.
Calocampa nupera, Lintn.
“ cineritia, Gr. rare.
“ curvimacula, Morr. rare.
Cucullia convexipennis, G. & R.
“ asterioides, Guen.
“ intermedia, Speyer.
“ Speyeri, Lintn, rare.
Crambodes talidiformis, Guen. (2 ex.)
Nolaphana malana, Fitah.
“ Zelleri, Gr.
Aletia argillacea, Hübn.
Marasmalus histrio, Gr. (1 ex.)
Telesilla cinereola, Guen.
Abrostola urentis. Guen. rare.
Deva purpurigera. Walk.
Plusia aereoides, Gr.
“ balluca, Gey.
“ Putnami, Gr. rare.
“ striatella, Gr. very rare.
“ thyatiroides, Guen. (2 ex.)
“ mappa, G. & R. (1 ex.)
“ bimacula, Steph.
“ precationis, Guen.
“ u-aureum, Boisd. ? rare.
“ mortuorum, Guen.
“ 8-scripta, Sanborn.
“ viridisignata, Gr. rare.
“ ampla, Walk. rare.
“ simplex, Guen.
“ Hockenwarthi, Hoch. (2 ex.)
Anarta cordigera, Thunb. rare.
Rhodophora florida, Guen.
Lygranthoecia rivulosa, Guen,
Pyrrhia exprimens, Walk. rare.
“ angulata, Gr. (1 ex.)
Tarache erastrioides, Guen.
“ candefacta, Hübn.
Lithacodia bellicula, Hübn.
Chamyris cerintha, Tr.
Eustrotia albidula, Guen.
“ concinnimacula, Guen.
“ synochitis, G. & R.
“ muscosula, Guen.
“ carneola, Guen.
“ apicosa, Haw.
Euherrichia mollissima, Guen. (2 ex.)
“ monetifera, Guen.
Brephos infans, Moeschl. rare.
Drasteria erechtea, Cram.
Euclidia cuspidea, Hübn.
Syneda Alleni, Gr. very rare.
Melipotis limbolaris, Gey. (1 ex.)
Catocala relicta, Walk.
“ var. Bianca, Hy. Edw. rare.
“ amatrix, Hübn. ?
“ concumbens, Walk.
Catocala var. Diana, Hy. Edw.
“ unijuga, Walk.
“ briseis, Edw. rare.
“ parta, Guen.
“ coccinata, Gr, (1 ex.)
“ ultronia, Hübn.
“ ilia, Cram.
“ cerogama, Guen.
“ { communis, Gr.
{ neogama,, Ab. & Sm. ? rare,
“ antinympha, Hübn.
“ coelebs, Gr.
“ crataegi, Saund.
“ gracilis, var. sordida, Gr.
Pseudolimacodes littera, Guen. (1 ex.)
Parallelia bistriaris, Hübn.
Panopoda rufimargo, Hübn. (1 ex.)
Erebus odora, Linn. (1 ex.).
Zale horrida, Hübn.
Homoptera edusa, Drury.
“ minerea, Guen.
“ Woodii, Gr. rare.
“ duplicata, Beth. rare.
Ypsia undularis, Drury. rare.
Pseudanthroecia coracias, Guen.
Homopyralis tactus, Gr.
Spargaloma sexpuncta, Gr. rare.
“ umbrifascia, Gr. rare.
Pangrapta decoralis, Hübn,
Pseudaglossa lubricalis, Gey.
Epizeuxis aemula, Hübn.
“ americalis, Guen.
Megachyta lituralis, Hübn.
“ deceptricalis, Zell.
Litognatha nubilifascia, Gr.
Chytolita morbidalis, Guen.
Zanclognatha laevigata, Gr.
“ cruralis, Guen.
“ marcidilinea, Gr.
“ minimalis, Gr.
Pallachira bivittata, Gr. (1 ex.)
Philometra longilabris, Gr.
“ serraticornis, Gr.
Rivula propinqualis, Guen.
Palthis angulalis, Hübn.
Phalenophana rurigena, Gr.
Capis curvata, Gr. rare.
Renia alutalis, Gr. (1 ex.)
“ restrictalis, Gr. rare.
“ Belfragei, Gr.
Bleptina caradrinalis, Guen.
Lomanaltes laetulus, Gr.
Hypena baltimoralis, Guen.
“ scutellaris, Gr.
“ manalis, Walk. (1 ex.)
“ bijugalis, Walk
“ abalienalis, Walk..
“ toreuta, Gr. (1 ex.)
“ evanidalis, Robs.
“ scabra, Fabr.
Eulintneria bifidalis Gr

NOTES ON THE EARLY STAGES OF SOME HETEROCERA.

By Henry Edwards.

Clostera inclusa. *Hbn. Young larva.*

Head black, shining, with double fovea in front. Second segment edged in front with bright yellow. Body black, with a series of bright yellow longitudinal stripes, those of the dorsum being the most distinct: 4 and 11 have small black tubercles in the centre. All the segments bear small jet black piliferous tubercles. The hairs of the body are all sordid white. Anal segment black. Under side dull yellow. Feet black at the tips.

Length (after first moult) 18 m. m.

Feeds in companies until after the second moult, the larvæ then separate and act independently of each other.

Thyridopteryx ephemeriformis. *Steph. Young larva.*

Head, 2d, 3d, 4th and anal segments pitchy, the rest of the body being dull smoky gray. Thoracic legs pitchy, concolorous with the anterior segment. Abdominal legs aborted, concolorous with posterior segments. After about six hours exclusion from the egg they begin to form their baskets of whatever material may be at hand, and do not appear to eat until the first basket covering is found. They are particularly active little creatures, and move very swiftly, with the posterior segments erect.

Catocala parta. *Guen. Larva.* (Full grown.)

Dull fawn color. Head, as in all the genus, flattened on the top, with deep frontal sinus. A black line surrounds the head, except at the junction with the second segment. There is a pale brownish dorsal line, and a sub-dorsal one, slightly waved, on each segment, and enclosing a darker space. These lines are most apparent at the junction of the segments. A rather broad, brownish lateral line, slightly waved, encloses the spiracles, which are brown. Feet and legs concolorous with the body. At the extreme lateral edge is a row of short sharp ciliæ.

Length 2.80 inch.

Willows. (A. W. P. Cramer.)

Depressaria Heracliana. *De Geer.*-Ontariella. *Bethune. Larva.* (Full grown.)

General color pale yellowish-gray, with a deeper yellow cast along the sides. Head and forepart of the second segment jet black, shining. On 3 and 4 are eight rather large black shining tubercles and two smaller ones, the latter placed dorsally. On the other segments the tubercles are all of the same size, arranged eight in front of and around the segment, the remaining two upon the dorsum. The thoracic legs are jet black, the abdominal concolorous with the body, with black ring at their base.

Length 18 m. m.

Feeds upon the flowers and seed vessels of *Archangelica atropurpurea*, L. But after passing through its last moult it burrows into the stems of the plants, feeding upon the pith.

Larvæ captured July 1. Last moult July 4. Burrowed into stem July 6. Changed to chrysalis July 8. Imagos emerged July 16–19. I am indebted to Mr. Vanwaggenen, of Rye, Westchester county, N. Y., for my knowledge of this species.

NOTES ON LEPIDOPTERA.

SPHINX SEQUOIÆ. Bdv. I recently received from my friend, Mr. R. H. Stretch, of San Francisco, several examples of this very rare Sphinx, taken by him in Butte county, California, in July last. They were all captured at night, flying about the light of an electric lamp. As far as I am aware only three examples of the species were previously known to exist in collections.

HY. EDWARDS.

RARE LEPIDOPTERA IN NEW JERSEY. Every year some scarce species are taken in this State, and Mr. B. Neumoegen appears to have been more than fortunate during the past season. His captures include among others *Melitæa Phaeton, Limenitis Ursula*, aber. *Feniseca Tarquinius, Thecla strigosa, Thecla Niphon, Papilio Cresphontes, Pamphila Pontiac, P. Massasoit, Hemaris axilaris, H. Floridensis, H. Buffaloensis, Thyreus Abbottii, Cressonia Juglandis, Melittia Ceto, Bembecia marginata, Fatua denudata, Ægeria albicornis, Thyris lugubris, Euchætes eglenensis, Parorgyia leuceophæata P. Clintonii, Lagoa crispata, Euclea querceti, E. ferruginea, Parasa chloris Monolenca semifascia, Phobetron pithecium, Limacodes rectilinea, L. fasciola, Adoneta Spinuloides, Apatelodes torrefacta, Notodonta stragula, Edema albifrons, Œdemasia concinna, Œ. eximia, Œ. badia. Coelodasys leptinoides, Heterocampa biundata, Dryopteris rosea, Tolype laricis, Xystus Robiniæ*, and many rare Noctuæ. The locality examined was in the vicinity of Morris Plains.

HY. EDWARDS.

ASILUS AND GEOMETER. While collecting in July last in the neighborhood referred to in the preceding paragraph I came upon a large colony of the pretty Geometrid moth. *Aspilates dissimilaria, Guen*, and was astonished and interested to see the persecution to which it was subjected by a large species of Asilus. The moths were very abundant, and as they rose out of the low bushes through which I walked, each specimen was followed by an *Asilus*, which appeared to be constantly on the watch. If the moth took refuge in the lower branches of the bushes the dipterous tiger followed and hunted the leaves and twigs as a terrier hunts a cover for a rabbit. The poor moth on being approached too closely by its tormentor would take wing, but was instantly followed and, in most cases, seized by its insatiate enemy, borne to the nearest resting place, and immediately killed. I captured some of the *Asilus* the moment the moth was seized, but in all cases death appeared to have ensued at once, the point of attack being the thorax of the *Aspilates*. One specimen of *Asilus* observed by me destroyed no less than eight of the moths in about twenty minutes, apparently only sucking the juices, and discarding the rest of body as soon as this operation was performed. HY. EDWARDS.

TOLYPE LARICIS. Lintn. While strolling about the lower falls of the Genesee yesterday I found six cocoons of *T. laricis* on the white pine. (*P. Strobus*). To-day I have a fine pair of moths from them, and think it worthy of record that the species is found elsewhere than on the larch, (*Larix Americana*) as the latter species does not grow where the cocoons were found. H. ROY GILBERT, Rochester, September 4, 1882.

NEW METHOD OF FEEDING LARVÆ. I believe I have made a discovery by which larvæ may be kept and reared on food prepared so as to last through the whole series of changes. I record my experience with those of *Papilio cresphontes*. The eggs were found on *Ptelea trifoliatum*. They hatched on October 9, so that they must have been deposited some seven days earlier. They reached their moults as follows: 1st stage, 16th to 18th; 2d, 23d to 25th; 3d, 30th to 31st; 4th, November 10th to 13th; 5th, or pupa, December 11th to 13th, at which time the weather was extremely cold, occasionally 15° below zero. The duration of the changes, 72 days. My method was to gather the leaves of the plant in summer, press them quite dry in a book or under weights as in botanical specimens, and, when feeding my larvæ, soak them all night in pure water, causing them to appear fresh and in growing condition. The larvæ preferred these soaked leaves to the fresh ones of oranges obtained from a greenhouse, though they would feed sparingly upon the latter when driven to it by hunger. I have also tried the experiment of soaked leaves with great success upon *Apatura clyton*. I trust this brief account of an interesting experience may be useful to lepidopterists, as eggs of species may be sent from any distance, accompanied by dried food plants, and the results will surely be satisfactory. The leaves must be kept in the dark, or the green color fades out and the flavor is destroyed. A. H. MUNDT, Fairbury, Ill.

LIMENITIS URSULA AND L. DISIPPUS. I have expressed my opinion to Mr. W. H. Edwards that these forms arise from the same brood. At three different times I gathered eggs and larva from a willow in my yard, and each time (all hatching within a few days of each other) some produced *Disippus*, and some *Ursula*. I could not perceive the smallest difference in the larva or pupa. The imagos I raised would not lay in confinement, so I was not able to pursue the investigation further. A. H. MUNDT, Fairbury, Ill.

MELITÆA CHALCEDON. Bdv. This species hybernates socially after the first moult, selecting a place below the radical leaves of cumbrous herbage, from which situation the larvæ do not stir for several months. I have kept them all the winter, and could not induce them to eat, but when they began to move about, they devoured the food-plant with great eagerness. Berkeley, Cal.
J. J. RIVERS.

ÆGERIA HEMIZONIÆ. Hy. Edw. I have reared this species from the larva, a pallid grub with a darker head, feeding in the roots, rhizome, or base of the canes of the cultivated raspberry, and devouring the pith therein. This is looked upon by fruit-growers as a direful insect, killing the plant, root and branch, but the injury is not so great as supposed. The larva feeds only on the pith, the loss of which is not immediately fatal, even to the part affected, much less to the whole. I have observed these Ægerian larvæ always in otherwise unhealthy plants, such as are infested with "scale," and mostly with the tumors of the "woolly aphis" upon their roots. This last condition is usually accompanied by bad cultivation. J. J. RIVERS, Berkeley, Cal.

PAPILIO CRESPHONTES. Cr. During the past year this species seems to have made its appearance throughout the country in large numbers and in localities hitherto unknown. From Wisconsin, Northern New York, Maine, Massachusetts, Connecticut and Illinois come reports of numerous captures, and many entomologists have been engaged in carrying through their various stages the handsome larvæ of this interesting insect. It is to be hoped that careful observations may be kept so that the perfect life-history of the species may be made known. HY. EDWARDS.

HYPHANTRIA TEXTOR AND H. CUNEA. I know these forms are generally regarded as belonging to one species, but the larvæ differ considerably in color and markings. Those of the latter do not make a web like those of *H. textor*, they are larger and feed also upon a different plant. The differences in the imago are very striking, the body in *H. cunea* being yellow and black, while in *H. textor* it is wholly white. Has any observer raised broods of the two forms? N. COLEMAN, Berlin, Conn.

PAPILIO.

Organ of the New York Entomological Club.

Vol. III.] February, 1883. [No. 2.

LIST OF LEPIDOPTERA COLLECTED JULY, 1882,

By W. W. Hill, Albany, N. Y.

All of these examples were captured at an average altitude of 2200 feet, in the heart of a dense forest, composed principally of balsam, spruce, pine and birch, at the foot of Mount Marcy, the highest peak of the Adirondacks and seven miles by trail and "blazed" line from its summit. Species marked thus * were netted during the day time. All of the remainder were captured inside of the Adirondack Lodge at night, being attracted by light. No sugaring was done.

RHOPALOCERA.

Papilio Turnus. L. 12 ♂ 1 ♀ *. Perfect examples were observed on summits of Marcy, 5344 feet, and McIntyre, 5112 feet.

Argynnis Atlantis, Edw., ♀, *.
Vanessa Antiopa (L.), ♀, *.
Limenitis Arthemis (Drury), 58 ♂–75 ♂, *.

HETEROCERA. SPHINGIDÆ.

Everyx Chœrilus (Cram.), ♂.
Smerinthus geminatus, Say, ♂.
Paonias excæcatus, A. and S., 2 ♂.
Calasymbolus myops, A. and S., ♂.
Cressonia juglandis, A. and S., ♂.

BOMBYCES.

Euphanessa mendica (Walk.), ♀.
Crocota ferruginosa, Walk., 2 ♂.
Platarctia parthenos, Harr., ♀, July 26.
Arctia Saundersii, Gr., ♂.
Nadata gibbosa (A. and S.), ♂.
Lophodonta ferruginea, Pack., ♂.
Cœlodasys unicornis, A. and S., ♂.
Platypteryx arcuata, Walk., 2 ♂–2 ♀.
Dryopteris rosea, Walk., ♂–♀.
" irrorata, Pack., ♂–♀.
Hepialus furcatus, Gr., 4 ♂ -♀.

NOCTUÆ.

Pseudothyatira cymatophoroides (Guen.), ♂.
" " var. expultrix Gr., 39 ♂-9 ♀.
Habrosyne scripta (Gosse), 14 ♂-♀.
Apatela innotata (Guen.), 2 ♀.
" hamamelis (Guen.), ♀.
Micrococlia fragilis, Guen., ♀.
Chytonyx palliatricula (Guen.), 2 ♀.
Agrotis perattenta, Gr., 2 ♀.
" rubifera, 3 ♀.
" plecta (L.), 3 ♀.
" clandestina (Harr.), 20 ♂-11 ♀.
" prasina, Fabr., 3 ♀.
Mamestra imbrifera, Guen., ♂ ♀.
" adjuncta, Boisd., ♂.
" lorea (Guen.), 2 ♂.
Hadena arctica, Boisd., ♂.
" vultuosa, Gr., 4 ♀.
" lignicolor (Guen.), ♀.
" remissa, Hübn., ♀.
" impulsa, Guen., ♀.
Hyppa xylinoides, Guen., ♂-5 ♀.
Trigonophora periculosa, Guen., ♂.
Euplexia lucipara (L.), 3 ♀.
Caradrina Miranda, Gr., ♀.
Orthodes cynica, Guen., ♀.
Cucullia postera, Guen., ♀.
Aletia argillacea, Hübn., ♂.
Plusia æreoides, Gr., ♀.
" mappa, G. & R., ♂ July 25; 2 ♀ July 26.
" u-aureum, Bd., 21 ♂-15 ♀.
" mortuorum, Guen., 23 ♂-25 ♂.
" octoscripta, Sand., ♀.
" ampla, Walk., 2 ♂-2 ♂, July 25 to 30.
Eustrotia albidula (Guen.), ♀.
Pseudoglossa lubricalis (Gey.), 4 ♀.
Epixeuxis æmula, Hübn., 4 ♂.
Megachyta deceptricalis (Zell.), ♀.
" inconspicualis, Gr., 5 ♂ ♀.
Zanclognatha cruralis (Guen.), ♂.
" marcidilinea, Gr., ♀.
" minamalis, Gr., ♂-5 ♀.
Rivula, N. S., ♂.
Palthis angulalis, Hübn., 4 ♂-♀.
Hypena Baltimoralis (Guen.), ♂-♀.
" scabra, Fabr., 2 ♂-66 ♀.

GEOMETRIDÆ.

Endropia obtusaria, (Húbn.), 3 ♂-♀.
" armataria, (H. S.), ♂-2 ♀.
Metrocampa margaritata, L., 2 ♂-♀, *, in deep woods.
Anogoga pulveraria (L.), ♀.
Angerona crocalaria (Fabr.), ♂-2 ♀.
Nematocampa filamentaria, Guen., ♂.
Acidalia inductata, Guen. ♂.

Callizzia amorata, Pack., 2 ♂-2 ♀.
Deilinea variolaria, Guen., ♂ ♀.
“ erythemaria, Guen., 3 ♀.
Macaria granitata, Guen., 4 ♂-6 ♀.
Caripeta divisata, Walk., 5 ♂-♀.
Cymatophora umbrosaria, Hübn., 5 ♂-4 ♀.
“ larvaria, (Guen.), 6 ♂-2 ♀,
Paraphia subatomaria, Guen., ♀.
Baptria albovittata, (Guen.), 6 ♂-♀.
Phibalapteryx latirupta, Walk., ♂-♀.
Rheumaptera ruficillata, (Guen.), ♀.
“ basaliata, (Walk.), 2 ♂-♀.
“ fluctuata, (L.) ♂-5 ♀.
“ lacustrata, (Guen.), ♀.
“ hastata(L.), 57 ♂-18 ♀. in great variety. *
A very few taken at light.
Ochyria abrasaria, H. S., 2 ♂-4 ♀.
Petrophora truncata (Hübn.),6 ♂-2 ♀.
Epirrita cambricaria, H. S., 2 ♂-4 ♀.
Glaucopteryx cumatilis (G. and R.), ♀.
“ cæsiata (Borkh.), 2 ♂.
Eupithœcia ———, 5 examples too much worn for determination.

PYRALIDÆ.

Aglossa domalis, Guen., ♂.
Asopia devialis, Gr., 3 ♂ -4 ♀.
“ squamealis, Gr., ♂.
Botis erectalis, Gr., ♂.
‘, maquistralis, Gr., ♂.

TINEIDÆ.

Cryptolechia Schlægeri, Zeller, ♀.

The following captures made by me in the Adirondacks have lately been described in the Canadian Entomologist, the types being in my collection.

Agrotis hospitalis, Gr., 2 ♀, July, 1880.
Anytus sculptus, var. planus, Gr., ♀, September 4, 1878.
Rheumaptera immediata, Gr., ♀, June 21, 1878; ♀, July, 1880.

ON STIRIA, WITH NEW GENERA AND SPECIES OF NOCTUIDÆ.

BY A. R. GROTE.

In the present paper I describe several forms of North American Noctuidæ, from East and West, which are among the most interesting I have yet discovered. The types are almost all contained in Mr. Neumoegen's large collection, which I have been recently studying. Perhaps the most notable of all here described is *Mamestra Bella*, taken by Mr. Neumoegen himself in New

Jersey, and which proves that we have yet fine species in the East undescribed. That it has a near ally in the European fauna makes the discovery more valuable.

TRICHOCLEA. n. genus.

Eyes hairy, lashed. Front with a protuberance concealed by the short, close scales; globose, clypeal plate prominent. Palpi moderate, third article distinct, oblique.. Tongue well sized. Tibiæ unarmed. Body untufted. Male antennæ ciliate, simple. Aspect of *Carneades*. Looks like a small *Mamestra Trifolii*. Care must be taken to distinguish this from very similar forms, differing structurally, from the same locality.

TRICHOCLEA DECEPTA. n. s.

♂ ♀. Carneous gray. Claviform and reniform, shaded with blackish lines faint, double, marked on costa. Stigmata small, concolorous. Hind wing white, with a smoky border broadest in ♀, and in this sex with a dotted mesial line before it. Beneath yellowish-white, with dots and extra mesial line more or less marked. Head and thorax like forewings, abdomen a little paler. The t. p. line is denticulate, followed by pale points; the sub-terminal field is unprominently darker shaded. A terminal dotted line. Fringe finely cut with pale. Thorax and head unmarked.

Expanse, ♂ 27, ♀ 32 mil. Three specimens. Arizona.

Coll. Mr. Neumoegen.

CARNEADES MOERENS. *Grote*.

Other ♂ ♀ specimens lately examined are more reddish than my type. This species must be examined under the microscope and its structure verified to make sure of the identification. The average expanse seems to be 28 mil. The insect has a slight resemblance to *Agrotis Citricolor*, but is faded ochrey, with a reddish cast; the terminal space darker. The genus agrees well with *Agrotis*, but may be quickly separated by the structure of the clypeus, which has a navel-shaped protuberance. The single species is dull and inconspicuous in color and markings. It was taken by Mr. Morrison in Arizona.

MAMESTRA BELLA. n. s.

Rich blackish-brown; sub-terminal line narrow, contrasting, yellowish, with a sub-costal shallow rounded projection, thence even, rounded to internal angle. Lines black, double. Claviform black, outlined in velvety-black. Orbicular pale, ringed with dark-shaded centre, ovate, somewhat oblique. Reniform opposedly oblique, narrow, dark, with incomplete pale ring behind. Cuneiform black marks before the s. t. line inferiorly. Fringes dark, very finely cut with pale. Head and thorax greenish-brown. Hind wings fuscous, paler at base, with discal mark and faint mesial line. Eyes hairy. Ovipositor exserted. Beneath paler, irrorate; hind wings with discal mark and double exterior bands.

Expanse 30 mil.

New Jersey. Coll. B. Neumoegen, Esq.

Resembles the European *Dianthœcia Cucuballi.* One of the prettiest of our Eastern species. The t. p. line is scalloped and rather strongly projected opposite the cell. Darker than the European species, and differing considerably in detail.

UFEUS SAGITTARIUS. n. s.

Red brown, with a slight mixture of pale scales. No lines on primaries. On the cell a pale yellowish streak, which joins the curved, similarly colored, linear, bow-shaped reniform. Hind wings pale, concolorous, yellowish fuscous; beneath with a thick trigonate black discal mark. The reddish fringes of primaries finely cut with pale.

Expanse, 40 mil.

Coll. B. Neumoegen, Esq. California.

This new species is very simply marked. The wings beneath are pale, discolorous, and are notable from the want of discal mark on fore wings, and the presence of the thick spot on hind wings. Head and thorax concolorous with primaries,

TRICHORTHOSIA. n. g.

Eyes hairy, lashed. Thorax untufted. Vestiture hairy, loose. Fore tibiæ unarmed; middle and hind tibiæ spinose. Palpi rather short, third joint conical. Tongue rather weak. Abdomen untufted. Fore wings with straight costal and full outer margin; apices sharp. Allied to *Xanthia* in shape of wings; differs from all the genera allied to *Orthosia* by its structure.

TRICHORTHOSIA PARALLELA. n. s.

Ochrey olive; terminal field white-shaded, contrasting, limited inwardly by the rigid, double, sub-terminal line, its inner component line thicker and not continued at apices. Reniform red-stained with inferior black dots; orbicular a dark dot. Ordinary lines double, faint. Hind wings fuscous, with pale fringes.

Expanse, 28 mil.

New Mexico. Prof. Snow.

ORTHODES NITENS. n. s.

♂ ♀. Silky reddish-brown, the male smaller and brighter-colored. The lines marked by double lines on costa, hardly to be made out, except in certain lights. Subterminal line a tolerably distinct succession of black points. Reniform small, white, contrasting, lying partly in the evident black angulated median shade. Fringe a little darker than the wing. Thorax concolorous. Hind wings and abdomen fuscous; fringe somewhat reddish. Beneath secondaries paler, irrorate, with distinct discal mark and diffuse band. Anal tuft of male ochreous.

Expanse ♂. ♀ 29 mil,

Kittery Point. Mr. Thaxter.

This species may go under one of the names proposed by Guenée in this genus, but it fits no one of his descriptions. It does not seem to vary, and I do not believe it has been before described.

TÆNIOCAMPA PEREDIA. n. s.

♂ ♀. Eyes hairy; body untufted; vestiture hairy; size small; allied to *Furfurata*. The color is more rusty ochrey and the wing is more speckled with dark, blackish points and shades. T. p. line marked by black dots. Median shade rather dark, diffuse, prominent. Orbicular spherical, entirely of the paler ground color; reniform with a central streak and black inferior dot. T. a. line, sub-continuous, double; inner line indistinct, waved. Head and thorax of the paler rusty ochrey ground color of fore wings; collar sometimes lined. Hind wings paler in male, pale fuscous, with contrasting paler fringes and discal mark. Beneath dirty-whitish; a very distinct terminal dotted line; discal mark and blackish sub-punctate extra-mesial line. Abdomen pale fuscous with ochrey anal hairs.

Expanse, 27 mil.

Kittery Point, Maine. Mr. Thaxter.

With the discovery of new Western forms since the publication of the "New Check List" I would now arrange the two groups, which I call *Calpinæ* and *Stiriinæ*, as follows:

CALPINÆ.

CALPE, *Tr.*
Canadensis, *Beth.*
HYPSOROPHA. *Hubn.*
Monilis, *Hubn.*
Hormos, *Hubn.*

HEMICERAS, *Guen.*
Cadmia, *Guen.*
PHIPROSOPUS, *Gr.*
Callitrichoides, *Gr.*
PLUSIODONTA, *Guen.*
Compressipalpis, *Guen.*

STIRIINÆ.

BASILODES, *Guen.*
Pepita, *Guen.*
Chrysophis, *Gr.*
STIRIA, *Gr.*
Rugifrons, *Gr.*
Sulphurea, *Neum.*
PLAGIOMIMICUS, Gr.
Pityochromus, *Gr.*
Expallidus, *Gr.*
Tepperi, *Morr.*
NEUMOEGENIA, *Gr.*
Poetica, *Gr.*

STIBADIUM, *Gr.*
Spumosum, *Gr.*
Aureolum, *Hy. Edw.*

FALA, Gr.
Ptycophora, *Gr.*
ACOPA, *Harvey.*
Carina, *Harv.*
Perpallida, *Gr.*
Incana, *Hy. Edw.*

Then follows, as in my "List, the *Plusiinæ*, commencing with *Telesilla*. The *Heliothinæ* follow *Plusia*, commencing with *Anarta*, as in my "List," the only change being in the genera of the *Stiriinæ* being transferred to before *Plusia;* the change of the position of the genera *Anarta* and *Lepipolys*, proposed in the appendix, being rendered unnecessary. The relationship of *Basilodes* to *Stiria*, *Plagiomimicus* and *Stibadium* had escaped me, but I feel sure that I am correct in placing *Pityochromus* and allies with *Stiria* rather than with *Lygranthœcia* or *Schinia*, from the structure of the thorax, which is very similar in all these forms and quite different from the *Heliothinæ*. Any one who has these species, and will so arrange them, cannot but so agree with me, both as to the validity of the genera and the naturalness of this arrangement.

The species noticed in this Paper are as follows:

Trichoclea Decepta. Grote, n. s.
Carneades Moerens. Grote.
Mamestra Bella. Grote, n. s.
Ufeus Sagittarius. Grote, n. s.
Tricorthosia Parallela. Grote, n. s.
Tæniocampa Peredia. Grote, n. s.
Orthodes Nitens. Grote, n. s.

NEW FORMS OF THE GENUS ALYPIA.

By Henry Edwards.

Alypia matuta. n. sp.

The species figured by Abbot and Smith, p. 87, pl. 44,[*] is certainly not the well-known *A. octomaculata, F.* to which it is referred by the above authors. A comparison of the figure of the larva with that of *A. octomaculata* will support this view, as that given by A. and S. is wholly bright lemon-yellow, with waved transverse lines of black, and with black spines. Several examples of the imago exactly agreeing with Smith and Abbott's figure have passed through my hands, and I venture to describe this form by the above name, believing it to be abundantly distinct in all its stages from the common species. The spots are considerably larger and differ much in shape from those of *A.* 8. *maculata* the basal spot of which, in the primaries, is either rounded or ovate, the outer one also ovate, with the edges even. In the present form the basal patch is sub-triangular in outline, straight along its internal margin, somewhat rounded costally, and terminating towards the base of the wing in a fine point on the median nervule. The outer patch is ovate, but with its anterior edge irregular in outline and somewhat constricted in the middle. The secondaries have the basal third pure white, not in any way interrupted by black, and the outer spot is much larger and more pyriform in shape than in *A.* 8. *maculata.* On the lower side the markings are repeated, the pale yellow patches of the primaries being united by a narrow yellow band.

Colorado, Missouri, Alabama.

Coll. E. L. Graef, F. Tepper, Hy. Edwards, B. Neumoegen.

This form is easily distinguished from *A*. 8. *maculata* by the utter absence of black at the base of the secondaries. In the ♀ of the well-known species the white basal patch of secondaries is sometimes nearly as large as that of *A. matuta*, but the extreme base is, as far as my examination of examples has shown, always black.

ALYPIA WITTFELDII. n. sp.

Size and form of *A. octomaculata*, to which it is closely allied. The primaries are, however, narrower than in the common species, and considerably more produced at the apices. The spots are much darker in color, being a light buff, instead of pale primrose yellow, and in strong contrast with the clear white spots of the secondaries. They are also different in shape, the inner one, which in the well-known species is nearly ovate, being here an imperfect oblong, and reaching nearly across the wing from the sub-costal nervure close to the internal margin. The outer spot is pyriform and much larger than the corresponding mark on any examples I have seen of *A. octomaculata*. The clear white spots of the secondaries are also small, the outer ovate, the inner oblong ovate. Base of the wing and abdominal margin broadly black in both sexes. Beneath the markings are repeated. The collar, tegulæ, palpi, and legs as in *A. octomaculata*.

1 ♂, 2 ♀. Indian River, Fla.

Coll. B. Neumoegen, Hy. Edwards.

I have dedicated this species to the discoverer, Dr. W. Wittfeld, who has done much to make known the existence in Florida of many rare species of Lepidoptera, as well as of others not previously recorded in our lists.

ALYPIA SIMILIS. *Stretch.*

N. VAR. CONJUNCTA.

In this form, which is apparently very rare, the yellow discal spot of primaries is joined to the triangular basal patch, giving a much paler appearance to the insect and suggesting the idea of a distinct species. The outer pyriform band of secondaries is also a little larger and nearer the margins of the wing. In all other respects the same as *A. similis*.

2 ♂. Contra Costa County, California.

Type. Coll. Hy. Edwards.

A BRIEF ESSAY ON CLASSIFICATION OF THE HETEROCERA.

By A. R. Grote.

A recent criticism upon the genera, which I have established in the *Noctuidæ* runs to the effect that I have regarded all modifications of structure as of generic value. This criticism loses force when we see that its author adopts seventy-five of my genera in the family and rejects but very few of my generic names for this reason. Since it appeared I have published many additional genera, so that in the *Noctuidæ* alone I have now described upwards of one hundred. It is important that the structural differences which have induced me to establish these genera should be discussed, and I, therefore, state that I have studied the following characters:

I. The *Head*, the structure of the compound eyes, presence of ocelli, form of tongue and palpi, width and appearance of the front, structure of the antennæ.

2. The *Thorax*, shape of collar, patagia, comparative shape of wings, structure of the wings, neuration, structure of the feet, especially of the fore tibiæ.

3. The *Abdomen*, comparative length and shape (consult my Illustrated Essay, p. 31, et seq.). Added to these, the vestiture of the whole insect has usually been studied and gives good characters. The tuftings of the body and the nature of the squamation, whether of scales like hairs, or flattened, or a mixture of these, or, again, of what I call "flattened hairs," intermediate in width, must be fully noted.

However low a character the neuration may be regarded by some writers on Lepidoptera, it is, at the last made the test of family distinction by Herrick-Schaeffer and modern authors generally. Although, as I showed many years ago, in some forms, e.g. *Thyridopteryx*, the neuration differs in opposite wings of the same individual, or, again, separates two species, otherwise closely related, such variation concerns merely the branching of certain nervules, and does not affect the general pattern, the relative distance of the two principal veins from each other, and the number of branches belonging to each. Thus, to some extent, the neuration affords only a variational or specific character; in another view it gives generic and even family criteria. In other words it is not different from the balance of characters used in classification; the *amount* and *extent* of the peculiarity gives the value. Every well-marked variation and modification of structure, which can be clearly made out, by the microscope or otherwise, is of generic value. The moment this rule is departed from we are thrown upon "opinions." Certain structural features are not to be considered "well-marked," as, for instance, the ordinary range of antennal peculiarity, slight changes in shape of wing, tibial armature, etc. In fact *all* the characters which, when *well-marked*, are of generic importance, are liable to slight modifications which are only specific. It is the *kind*, *constancy* or *amount* of these modifications which decides the class in all our artificial divisions of these natural objects. This really decides *individuals*, *varieties*, *aberrations*, *species*, *sub-genera*, *genera*, *sub-families*, *families*, *sub-orders*, *orders* and *classes* throughout the animal kingdom.

In the antennæ of moths the range of variation is so great that it is only upon an unusual departure (e.g., *Renia*) that we can use them as generic characters. They are different in the sexes, and here we come upon the question of secondary sexual characters. It is clear that when the departure of one sex is as strong as usually demanded by generic differences, we should use a distinct title. Such genera are not equal to ordinary genera, where the characters are shared by both sexes; but neither are all *species* equally strongly distinct. Just as on a former occasion I drew attention to certain assemblages which I called PRO-GENERA, of which *Datana* is an example, so here I call such genera as are founded on peculiarities shown oftenest by the male sex, ANTIGENIC. The genus *Heliochilus* is a case in point.

Here we have such an unusual structure of ♂ wing that it has but but few parallels in the Sub-order. *Euscirrhopterus* is another case in point. Now, it is clear that to throw *Heliochilus* into *Heliothis* is to contradict the diagnosis of the latter and to prevent our recognition of a peculiar structure. There is another species of *Heliochilus* apparently found in Asia. To refer both of these to *Heliothis* is to obscure the facts which all our classifications are intended to make plain. We must not lose sight of the fact that we are trying to fit plastic structures into unyielding categories, "to put nature into a straight jacket," as Dr. Packard calls it. Evidently we must increase our categories. The number of purely antigenic genera is small, but of those of a mixed character, in which features drawn from one sex alone (more often the male), are important in the diagnosis, the number is considerable. In *Arzama*, among the *Noctuidæ*, the female has a secondary sexual character in the large anal tuft. The ordinary genus, as I have considered it in the moths, takes in species agreeing in well-marked characters, allowing a certain range in minor respects of structure. But the moment we put together species with well-marked differences, we cover up the study of these differences. Here is where the tact and talent of the student come into play to decide upon the limits of ordinary genera. The question, under the rules here presented, is really simplified and the cases for a difference of "opinion" reduced to a minimum. A generic character must be decided upon with a knowledge of the amount and kind of variation in structure in the group.

There is, finally, something real in family form, as elucidated by Agassiz, which Dr. Packard, in the moths, finds in head-characters and Dr. Herrich–Schaeffer in wing-characters. Lederer seems to find an average from all parts of the ringed butterfly or moth; his "families" differing more from the combination of characters they present. Exceptions to any one family character, such as disproportionate size in the whole insect or any of its parts, do not appear to me to invalidate the conception of a family. I do not wish to enter into argument as to the best classification of the *Tineidæ*, but, disagreeing with Mr. Chambers, I do not think any one would take *Anaphora* for anything but a Tineid. There are difficult genera on the confines of almost every family, but I think that after a complete knowledge of all the characters, and the neuration is a very important one, we shall finally be able to agree upon the best position for any moth we have discovered yet, and this without establishing any family to rank with the *Pyralidæ*, *Tortricidæ* or *Tineidæ* (excl. Alucitæ), as now considered. So far as we know we are not warranted in considering the *Tineidæ* as consisting of an assemblage of degraded forms, but a natural group affording sub-families not differing more widely on the whole from each other, than do the sub-families of *Pyralidæ*, as arranged in my "New Check List." When we come to the study of descent we are without palæontological evidence, in fact, without *any* evidence which would justify our considering the long ciliæ as degradational. We have some evidence that a short tongue is a character of an old type and that the long maxillæ have come into existence with flowering plants. Thus, that the *Bombyces* are a group of sub-families, descended from a short-tongued early group of *Lepidoptera*, is a reasonable supposition. Aquatic habit, more or less correlated with structure, may be assumed as degradational, since it is exceptional in different families, and a water-life is lower than a land-life, as we see that it obtains in embryonic conditions and in low groups of annulose animals. In this connection Professor Comstock's discoveries of aquatic and predaceous larvæ in our moths are of immense importance. Great interest attaches to special enquiries of this kind, i. e., as to the value of a larger or smaller number of abdominal fleshy feet to the larvæ. So far as we can judge of degradational characters from biological data we have a solid basis for our deductions. The absence of testimony from fossils renders a certain class of speculations valueless. To return to the subject of classification, we cannot afford to dispense with neurational characters; hence, I should object to Mr. Smith's recent synopsis of the *Noctuidæ*, upon the ground that he distinctly passes over this important branch of the study. Although it is uniform, to a large extent, the neuration of each genus should be given, and of every species studied. The entire structure should be known when we enter upon a re-organization of the genera of described species. In conclusion, I must generally agree with Lord Walsingham's remarks on the *Tineidæ*. So far as I have studied them, we appear to be able to classify our moths under one or other of the families: *Sphingidæ*, *Ægeriadæ*, *Thyridæ*, *Zygænidæ* (incl. Castnia), *Bombycidæ*, *Noctuidæ* (incl. Cymatophora. Brephos), *Geometridæ*, *Pyralidæ*, *Tortricidæ*, *Tineidæ*, *Pterophoridæ* (incl. Alucita . The more "difficult" families are those in which the structure is divergent by reason of the placing in them genera of uncertain position, intermediary in character, or again isolated by an apparent "dropping out" of connecting forms. The *Sphingidæ*, *Ægeriadæ*, *Geometridæ*, *Tortricidæ*, and *Pterophoridæ* seem more easily recognized than the rest. They may be considered to be more distinctly specialized groups and, perhaps, of more recent origin. Among existing *Bombycidæ* *Pyralidæ* and *Tineidæ* we may, I believe, look for some of the oldest structural types of moths. Assuming that the featherwing is a degradational character, as it is found in low forms in other sub-orders, we may consider the *Pterophoridæ* as having been thrown off from the *Tineidæ*, but not as an older type in time of the *Lepidoptera*.

NOTES ON ORGYIA BADIA, *H. EDWARDS.*

By R. H. Stretch.

Having found this species in abundance at Astoria, Oregon, on July 31 of this year, I give such notes on its transformations as were obtainable, in the hope that it may be the means of settling its specific standing.

On June 17 I found a mass of eggs which I judged to belong to this species. Many larva hatched during the succeeding week at intervals, but I could not induce them to eat, although I offered them rose and willow leaves, and the brood was lost. On my return to the same locality July 31 I collected the larvæ, cocoons, and one perfect male. Other males subsequently emerged (Aug. 6 and 8), but no females. Indeed the bulk of the cocoons found were apparently males (judging from their size) which in this genus is an excellent guide, the sex of the larva being also determinable by both size and color. The males do not vary appreciably, and are so like those of *Orgyia Antiqua* of Europe that I am inclined to think with my friend H. Edwards that the two species are identical.

Egg.—Unlike our Californian *O. vetusta* and *O. gulosa*, the eggs are not deposited in a mass on the female cocoons, in a mixture of the down from the body of the parent, but are spread out on the surface of the cocoon in a thin sheet, side by side, with no covering. The young larvæ consume about half the empty shell.

Larva.—Body black both above and below in some cases, in others there is a broad, dorsal, velvety-black line, the sides paler, with an indistinct darker lateral line between the first and second tubercles, sometimes followed below by a pale, broken line. Head black. Second segment very short, carrying two black fascicles directed forward, somewhat tufted at the tip, and a few, long, pale hairs between them at the base Segments 3 and 4 are short, with four small, yellowish lateral tubercles on each side, with pale, short radiating hairs. Segments 5 to 8 similar, each with a compact yellowish, stiff dorsal tuft or brush, and three lateral tubercles on each side, with pale radiating hairs, that nearest the dorsum orange-colored and conspicuous, the others tawny and obscure. Segments 9 to 11 similar. The black dorsal stripe is narrowly edged with pale yellowish, each segment carrying a few pale marks in the black dorsal line. Four lateral tubercles on each side, the two uppermost orange and conspicuous, the others pale. All with pale hairs. Segment 12 similar to 11, but only two lateral tubercles on each side, the uppermost orange, and a stiff, vertically compressed, black fasicle, directed backward, of which the posterior hairs are the longest. Thirteenth, dusky with long, dusky hairs. Legs brownish. *Length,* 1.00 to 1.25 in.

The special characters are the black appearance of the larva, the pale marginal mottlings of the dorsal line on segments 9 to 12, the hairy orange tubercles, the want of brilliant dorsal fleshy tubercles, and the pale lateral line in pale colored examples. In the black examples, the orange tubercles and dorsal mottling on segments 9–12, are alone conspicuous.

Imago. ♂.—Comparison of 5 ♂ *Badia* with 2 ♂ *Antiqua* received from Dr. O. Staudinger, reveals such trifling differences that unless the larval differences are considerable, the two forms must be considered one, and as Mr. H. Edwards suggests *nova* of Fitch must probably share the same fate. My specimens of *Antiqua,* it is true, are somewhat smaller than the five *Badia,* and there is a browner tint on the latter than obtains on *Antiqua,* but so far the markings on the primaries above are identical in both forms, while the secondaries above and the entire insect beneath, as well as the body parts, show no appreciable difference.

San Francisco, August 10, 1882.

ON CERTAIN CATOCALÆ.

By C. E. Worthington.

Catocala Lucilla. n. s.

Primaries dull white, thickly overlaid with gray and bluish scales, but exhibiting the ground color in several conspicuous patches, the largest beginning near the costa, immediately in front of reniform, extending to and including sub-reniform. Submarginal well defined and nearly continuous, bordered before with dull white and bluish-gray, t. p. line heavy, bluntly toothed, the inferior tooth small, sinus near inner margin black and heavy, t. a. line heavy, reniform outlined in black, sub-reniform pale, wide open, in about one example in four, and closed in others.

Secondaries red, median band constricted at one third of its length from costa, not reaching abdominal margin, but sometimes supplemented by a small spot. Beneath as in others of the group. Size, that of *C. unijuga* or a little larger.

This is the form alluded to by Mr. Grote in Can. Ent., Mch., 1882, as an unnamed variety of *unijuga*, which species it closely resembles, differing mainly in the somewhat larger average size, the clearer markings and the less continuous band of secondaries, the toothing of t. p. line is different, the white spaces, reniform and transverse lines clearly defined and without the distinguishing squamosity of *unijuga* and, altogether, the species is a clearer and brighter form than the other.

I have taken this form in considerable numbers in this vicinity (Cook County, Illinois, and Lake County, Indiana) for a number of years and have gradually come to regard it as distinct from *unijuga*. Notwithstanding their close superficial resemblance from the fact that *Lucilla* occurs invariably a month later than *unijuga*, with a distinct interval in which neither form is taken, I describe it as a species, as its identity with *unijuga* can only be settled by breeding.

CATOCALA JUNCTURA. *Walk.*

This form (as determined by Mr. Butler) occurs here sparingly or a variety of *unijuga* simulating it closely. Examples are taken here not in any way to be distinguished from *Walshii* (*junctura*) from Kansas, with all manner of intergrades between that and *unijuga* and, occasionally, a well defined specimen of the latter, having the peculiar terminal hook on band of secondaries. It seems quite probable that a closer study of these forms will resolve *unijuga*, *Walshii*, *junctura* and, perhaps, *Lucilla* and other forms into climatic varieties of one species.

CATOCALA ILIA.

Variation *Conspicua.*—Primaries, brownish-gray; reniform, large, white; sub-reniform, obsolete, traces of pale brown and bluish-gray in interspaces, a dark patch adjoining reniform exteriorly.

Variation *Duplicata.*—Primaries, brownish-gray; reniform, large, white; sub-reniform, pale, connected with t. p. line. Some pale brown and bluish scales in interspaces, dark shade behind reniform.

Variation *Obsoleta.*—Primaries brownish-gray; reniform with pale brown centre surrounded by black line, and enclosed in white spot; sub-reniform entirely obsolete; basal dash continued by a distinct dark shade to near apex. Sprinkling of pale brown and bluish-gray scales more conspicuous than in preceding.

Variation *Decorata.*—Color as in preceding; reniform like *obsoleta,* but less distinct; sub-reniform large, pale and wide open, or rarely closed; powdering of bluish-gray and pale brown scales in interspaces conspicuous; dark shade behind reniform heavy.

Variation *Umbrosa.*—Primaries uniform brownish-gray with hardly traces of other colors. Markings all present but more or less indistinct.

Variation *Confusa.*—Paler brownish-gray; reniform with pale brown centre in a darker brown ring outlined with bluish-white; sub-reniform, pale and connected merely with top line. All markings in brown, t. p. line being darker than the rest, the bluish-gray scales sparsely distributed over whole wing. Secondaries *orange-red.*

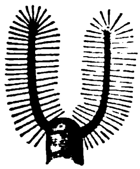
In a large number of examples of this very variable species I have found none that cannot be placed under one of the forms described, nor do the gradations between them seem finer than between *innubens* and *scintillans.*

No better illustration of the uncertainty of the position of the sub-reniform as a specific character can be found than in this species, where in one form a portion of the examples have this wide open, another portion closed, but connected with t. p. line, and still others with the spot entirely detached. In the species, as a whole, all gradations can be found, from no sub-reniform at all, to individuals with it large, pale and wide open.

The forms now described, by placing *obsoleta* at the head, and following with the others in the order named, form a very pretty series, and if *obsoleta, decorata, umbrosa* and *confusa* be selected, they would readily pass as distinct species; great variation is observable throughout in the indentation of the t. p. line, but not sufficiently to admit of further division, no ground for such division, either as a matter of convenience or otherwise being apparent, unless the position of the sub-reniform in *decorata* should justify dividing this one form into three. All of these variations appear to be strictly morphic, the species being single brooded, and there being no apparent limit of variations to localities.

ANAL APPENDAGES OF LEUCARCTIA ACRÆA.

By R. H. Stretch.



Not having, in my reading, seen any notice of certain very peculiar appendages to the abdomen of this common insect, it may be interesting to put on record some observations made a few evenings since. It may be that they are well known, but if not I will suggest that examination be made to see if the

Eastern examples differ in any way from our Californian ones in this respect.

While collecting round the suburban street lamps I thought I had found a moth with most peculiar antennæ, the moth being invisible at the time. A closer inspection showed the objects to be the anal appendages of a male *acræa*. To preserve them extended I attempted to kill it suddenly by crushing the thorax, but when I got it in my hand there was nothing visible but two tufts of black hair slowly disappearing under the penultimate (ventral) segment of the abdomen. By applying a gentle pressure from the base of the abdomen towards the tip I was fortunate enough to see them gradually protruded, presenting a most beautiful appearance, and by tying a thread tightly round the tip of the abdomen was able to retain them extended.

They each consist of a delicate membranous tube, gradually tapering to the tip, covered all over with the most delicate, evenly cut, silky black hairs, which stand erect when the organ is distended, presenting the appearance of a miniature copy of the small circular brushes used for cleaning lamp-chimneys. The hairs are nearly one-eighth of an inch long, and the total length of the organ fully half an inch.

They do not protrude in a direct line with the body, but project somewhat from the sides and then curve backwards parallel to each other about three-eighths of an inch apart, so that their shape is somewhat like a horseshoe, with the prongs directed backwards. The membranous tube is nearly white or pale yellow and when held against the light is apparently ringed somewhat like a tracheal tube.

They are evidently inflatable at will, but, apparently, are but seldom used. This is the first time they have come under my notice, although I have taken the insect abundantly for years, as all collectors must have done.

Since noticing them I have not taken a female, so that I cannot say whether they are confined to the male sex, but presume they are. They are present in the three males I have examined and, doubtless, may be classed under the head of sexual appendages. Will some Eastern collector look if anything like them occurs in the genus *Spilosoma?*

San Francisco, September 9, '82.

NOTES ON LEPIDOPTERA.

Samia Columbia and its Parasite. In the May No. of "Papilio,' 1882, appear some notes on the food plants of this species, in which its northern habitat is indicated. Since writing these notes I have received evidence of its occurrence in Manitoba, at a point 120 miles west of Winnipeg and 20 miles north of the C. P. R. and have now, in my possession a cocoon containing a living pupa collected at that point. No doubt the species is correctly named *Platysamia Columbia*—or perhaps more properly *Platysamia Cecropia Var. Columbia.* I have also found a parasite on this species which is believed to be new to science, and have ventured to name it *Echthrus Provancheri* in honor of my esteemed correspondent and friend L'Abbe Provancher of Caprouge, P. Quebec. W. BRODIE, Toronto.

LOCALITIES OF DIURNALS. In the descriptions of some new species collected by me, ("PAPILIO" Vol. 1. pp. 43–48) Mr. W. H. Edwards has accidentally given a few erroneous localities, which as a matter of interest to Entomologists, I hasten to correct. *Anthocaris Morrisonii* is found on the barren *mesa* lands, particularly the summits of small hills, near Kern River, Calif; *Melitæa Perdiccas* on the small prairies numerous near Puget Sound, Washington Territory. It was abundant near Tenino. *Melitæa colon* was found on the sides of the hills which line the banks of the Columbia river, in W. Washington Territory and Oregon, being especially common near Kalama. *Copædes eunus* was taken in the bottoms of Kern River, near Bakersfield, Cal., and *Pamphila sirus* and *P. Mardon* on the prairies of Washingtan Territory, mentioned above. H. K. MORRISON.

CATOCALA CONCUMBENS ab. HILLII. This very singular aberration has been taken by Mr. W. W. Hill at Center, N. Y. The specimen is perfect and resembles in every particular the usual male type of the species except that the hind wings are of a very light pale yellow, deepening in color at the base. This aberration recalls *C. Illecta;* and, as I have before pointed out, there is no question that the species are related. The division into groups from the color of hind wings no doubt, occasionally separates related species in this genus. A. R. GROTE.

CALLIDRYAS FISHERI. n. sp. or var.

Primaries rich yellow, almost the same shade as the ground color of *C. Philea*, ♂, but with a slight buff tint, a little paler at the base and along the basal third of the costa. Discal spot, extreme apex of the wing, costal margin and seven marginal spots on the termination of the nervures, rich reddish-brown. In the small apical patch are some dark-brown scales. Fringes alternately brown and pale yellow. Secondaries wholly golden-yellow, a trifle deeper in color at the margins, with the discal spot of under side faintly visible. Beneath paler and less vivid than above, very sparingly flecked with reddish-brown spots. On the primaries is a faint sub-marginal band, straight as in *C. Agarithe* and the discal spot larger than on the upper side. The secondaries have a moderate ovate discal spot and a smaller round one above it brown, with the centre of each clear silvery-white, Head and antennæ reddish-brown. Thorax, above black, with long greenish-yellow hairs. Beneath, the thorax is lemon-yellow. Abdomen, above and below, golden-yellow, concolorous with the wings. Exp. wings 2.00 inch. 1 ♂, La Paz, Lower California. Mr. W. J. Fisher. Mr. A. G. Butler thinks this may be a var. of *C. Agarithe* If so, it is a remarkable one and well deserving of a separate name. Its small size and absence of the ordinary spots are strong characters. HY. EDWARDS.

PAPILIO CRESPHONTES. *Cr.*

I have captured a good many specimens of *Papilio cresphontes* the past season, mostly in the latter part of summer, but I saw a fine specimen flying near the middle of October. Several specimens have been taken by other persons, and the species appears to be common through this portion of the State. I found several larvæ, some quite small, being only about seven lines long; some also fully grown, which pupated about October 23. The larva appears to feed wholly in the day time. The change to the pupa occupied nearly four days in all. After tastening itself by its tail to the box cover, it remained suspended for over a day before fixing the loop around the shoulders, being over two days before the final change to the pupa, the last transformation occurring in the night. N. COLEMAN, Berlin, Conn.

ERRATA. Vol 3, No. 1, p. 11. The sentence, "a similar larvæ," to "margins of the leaves," belongs to *Habrosyne scripta*, and should follow the passage ending, "its early moults." P. 19; for *Entomopthura* read *Entomopthera.*

PAPILIO.

Organ of the New York Entomological Club.

Vol. III.] March, 1883. [No. 3.

COMMENTS ON DR. HAGEN'S PAPER IN NOV.-DEC. NO. OF PAPILIO, ON P. MACHAON, ETC.

BY W. H. EDWARDS.

My own views on the subjects treated of by Dr. Hagen are so different from his that I cannot let his paper pass without notice, the more especially as now that he has seen the way to the demolition of half a dozen unlucky species of Papilio, he is is evidently warming to the attack in other quarters. This, as he tells us, is but "a portion of a Preliminary Report on the Butterflies of Washington Territory," and by the sample we judge the piece.

My learned friend, whose great attainments in biology and in general entomology we all recognize, is also a specialist, and his specialty is not the Lepidoptera. In Neuroptera or Hymenoptera he is high authority, in fact, in the former, the highest we have, but it is no disparagement to him to say, that in Lepidoptera, and especially in the North American Diurnals, he has not been known as an expert. That he should sit down, therefore, to a Report on Butterflies, and be able to give us fifteen printed pages on the first genus treated of, strikes me as something out of the common.

Now, it came to pass last summer that Dr. Hagen was offered the opportunity of accompanying the N. T. Survey, with the privilege of collecting what he could without hindering the purpose of the Survey; but was "expressly prohibited from advancing systematical or biological entomology." It was a great thing to be allowed to collect at all, but a most unfortunate one that not even a butterfly egg could be gotten unless it was picked off a bush, and that would amount to nothing, without violating the conditions of the appointment. Questions have been raised that could easily have been settled by breeding the butterflies from the eggs, laid by the females of the Papilios in confinement, but, as it was, except two mature caterpillars of *Oregonia* discovered, nothing whatever was done towards the biology of any of the species treated of in the Doctor's paper. The entomological party seem to have been in the field ten to fifteen days, from June 24 to July 5, and were on the wing all the time, but brought home a large lot of butterflies of various species. The results of that excursion seem to have aroused in our friend an enthusiasm that will not be restrained, and it is clear he dreams of oversetting the work of a score of lepidopterists who have gone before him, and of constructing on the ruins a sort of Ptolemaic system of arrangement of our species. I would not say a word, if this system were to be based on the preparatory stages of the several species, but that does not enter into it at all. What the system may probably be in its details is shadowed in a remark in a letter to me from the Doctor some time this winter, that after having worked a number of weeks on Colias, he "is *getting the whole series into three or four species*," [*] i. e., the North American Colias.

As there are something over a couple of dozen species of Colias claimed to belong to our fauna, of only two of which, outside of *Cæsonia* and *Eurydice*, are the preparatory stages at all known, this is evidently a weighty piece of work. All I wonder at is, that my good friend should stop at three or four, when it is just as easy to say one, and have all the species rank as varieties of that; as Colias *Primordia*, var. *Eurytheme;* var. *Philodice*. Really, I admire the zeal displayed and sympathise with the enthusiasm, but I must refuse utterly the conclusions reached by the Doctor. I have not much hope, however, that anything I shall say will alter his views. When a Professor of Biology, even with but a moderate acquaintance with butterflies, can deliberately declare that "it is probable that P. *Brevicauda*, *Bairdii*, *Indra*, *Pergamus* and probably *Americus*, belong all to P. *Asterias*," I fear he is past praying for. I write then not so much for him, but for a younger generation, who have grown up under more liberal teaching.

I hold that every permanent form possessed of marked characters which distinguish it from other forms, and which breeds true to its type, so far as appears, or we can know, is to be regarded as a species, at least, till the contrary is proved. And the proof must be actual, not imaginary, facts, not guess-work. That this is directly opposed to the view which can lump species into one, when nothing whatever is known of them, except what the dried butterflies show, and after the fashion set forth above with the *Asterias* group, goes without saying.

---

[*] The lepidopterists of Europe are not agreed as to the position of divers of their own species of Colias, though 150 years have passed since Linnæus, during which time many generations of active workers have come and gone in every country. No one can say to-day what are the relations between C. *Palæno* and C. *Pelidne*, or if there be any at all; and, for all that matter, no one will be able to speak with knowledge till both forms have been bred from the eggs laid by the respective females. All investigations which begin and end with the dried butterflies in cases of doubtful and obscure species amount to nothing. One may argue forever from the butterfly and be no whit nearer real knowledge of the facts. And now, what has not been done in Europe in five generations, our earnest friend thinks he can do with the American Colias "in course of a number of weeks" inside tho walls of the Cambridge Museum. I recommend a tent in the field for a few seasons, and hard work, with much fatigue and many disappointments, but with patience to overcome all; then we shall begin to see results.

The attack is opened upon Papilio *Zolicaon*, so named and described by Dr. Boisduval, who was one of the foremost European lepidopterists of this century. Another species, P. *Oregonia*, was recently discovered by Mr. Henry Edwards, and described by myself. On p. 150 we read, "the large number of specimens of both sexes (74) approves the statement that both species *cannot be separated*." And establishing this proposition to his own satisfaction, the Doctor advances to "the knotty question of the American P. *Machaon*." That is, *Machaon*, var. *Aliaska*, Scudder. After running through the whole literature of *Machaon*, the peroration has the RING of victory. "Can the separation of the American species" (*Zolicaon*, *Oregonia*, etc.) "be maintained? I answer boldly, NO!. After the examination of a hitherto unparalleled series of specimens, showing EVERYWHERE INTERMEDIATE FORMS, they should be considered as local or climatic varieties of one and the same species, of P. *Machaon*." And he closes, to the dismay of some of us, with the announcement that Mr. Pryer has now united eleven, perhaps twelve, species of Terias as belonging to one and the same species, which author concludes that "*neither size, shape nor color can be relied on as guides for specific distinction;*" and as he retires, comes this Parthian shot, "I believe that a revision of the North American butterflies *on this basis* is a want." At which I gasp, may heaven forbid that Mr. Pryer, or any of his disciples, should devote their destructive energies to the North American butterflies! I do not know Mr. Pryer, nor what sort of an observer he may be, nor what his facilities for the study of the Terias may have been, but this I do know, that unless he has arrived at his conclusion by breeding from the eggs, the assertion above quoted, if it really is intended to mean what the naked words declare, is not worth the paper it was written on. If eggs laid by one of the eleven or twelve species produced the rest, then the assertion might be made good, otherwise it is the sheerest guess-work.

Let us proceed to consider the statements of this paper. It is said, on p. 150, that seventy-four specimens of both sexes were taken in Washington Territory, east of the Cascade Mountains. "The typical *Zolicaon* is represented by half a dozen specimens flying promiscuously with the others." (If they fly at all in the same territory, they fly promiscuously, of course. In one group, by a puddle on the road, I often see P. *Turnus*, *Ajax*, *Troilus* and *Philenor*). "The main part of the specimens belong to P. *Oregonia*." What "true *Zolicaon*" is, the Doctor tells us under four heads. What "true *Oregonia*" is, we are left to infer, and in every case it is something not typical *Oregonia*. One or more characters are constantly modified in the direction of *Zoli-*

caon, or, at least, the Doctor thinks that is so. It does not appear from the text that a typical *Oregonia* was seen at all. I have no doubt several were taken, but nothing is said of it. We merely see a lot of nondescripts put down as "true *Oregonia*." We are, to be sure, told on p. 151, what the Doctor's ideas of *Oregonia* are; to wit, that it "is merely a variety of *Zolicaon*, mostly larger in size, more yellow, the black spot connected with the interior anal band, which is somewhat dilated on tip" (what is dilated? the band certainly is not), "the black bands of the abdomen narrower." That is no description of *Oregonia*, and I really have no evidence that the Doctor saw the species at all. What he so describes he says is merely a variety of *Zolicaon*.

These nondescripts, on p. 160, are called "intermediate forms," and the argument is that they connect *Zolicaon* and *Oregonia* in such a manner that the two so-called species cannot be separated, and *Oregonia* being assumed to be a derivation from *Machaon*, the other must be as well. There is a radical difference between "an intermediate form" and "an intergrade." The latter connects two varieties of a species, but a form may be intermediate and connect nothing. A jackal is intermediate between a dog and fox; a short-eared owl is intermediate between a long-eared owl and the great horned owl; and intermediate forms stand in every genus of butterflies. So that to say, that in this series of Papilios are "everywhere intermediate forms," means nothing. The intention is, that everywhere are intergrades linking together the principal forms, so that the latter must be varieties, and not species. Were they species, the intermediate forms would be *hybrids, not intergrades*. Whether they be species or not remains to be seen. Besides the "Americans forms," the Doctor gets half a dozen hitherto supposed good species of the old world under the wing of *Machaon*. Of these last I have nothing to say, but I intend to show that the deductions are wholly at fault with the American species, and by inference they are probably so with the others.

I propose, then, to make it apparent:

I. That *Zolicaon* is a distinct species, having no affinity with *Machaon*, and that it never could have been derived from *Machaon*, or the reverse.

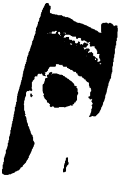
II. That *Oregonia*, while nearly all its affinities are with *Machaon*, and it belongs to the same group, yet is distinct from that species and is a species by itself; that neither could have been derived from the other.

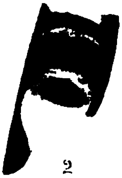
III. That *Zolicaon* never could have been derived from *Oregonia*, or the reverse, the two belonging to distinct groups.

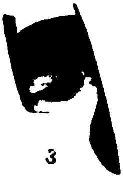
We must first discover what are the special characteristics of each of these species or forms.

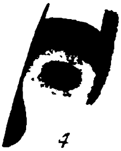
I. What is *Zolicaon?*

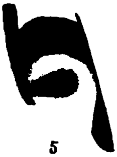
1. It is distinguished by a complete ocellus at the anal angle

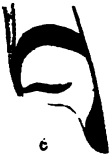

1

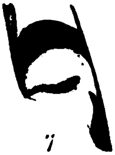

2

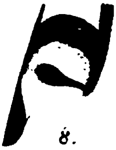

3

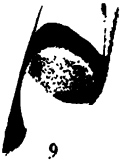

4

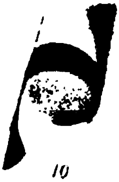

5

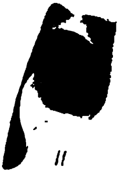

6

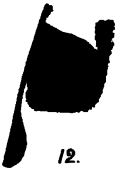

7


8.


9


10


11


12.

EXPLANATION OF PLATE I.

Illustrating the peculiarities of the anal ocellus in four species of Papilio, drawn by Mrs. Mary Peart. Figs. 1–3, 9–12 are drawn from nature. Figs. 4, 5 and 6–8 are copied from the plates in But. N. A., vol. 2, for which they were drawn from nature by Mrs. Peart.

1. Asterias; fig 1, circular pupil.
   " 2, oval "
   " 3, pupil connecting with the marginal stripe.
2. Zolicaon; fig. 4, circular pupil.
   " 5, pear-shaped, etc.
3. Oregonia; " 6, striped ocellus.
   " 7, 8, club-marked ocellus.
4. Machaon; " 9 to 11, blind ocellus, with variations, the stripe extended three-quarters and more around the circle; 11, with bulb at end.
   " 12, showing the bulb severed.

of the hind wing. This ocellus is fulvous, round, with a narrow black stripe or rim on the side next the inner wing-margin, which stripe or rim ends at half-way down the fulvous ground on that side. In the centre, or sometimes a little out of centre, is a black pupil, usually round in the male, but sometimes oval, especially in the female, and sometimes, most often also in the female, and on the under side, pear-shaped (figs. 4, 5).

2. The cell of fore wings, on under side, is solid black, except for two yellow cross-bars, one on the inner side of the arc, the other a little distance towards the base.

3. The body is black, with a lateral yellow band along the abdomen.

This is the type, as designated by Dr. Boisduval. He expressly says: "It is easily distinguished from *Machaon* by its pupilled ocellus, and the body entirely black on under side." "Body black, with a lateral yellow band." He says it is near *Machaon*, especially the variety *Sphyrus*, but at first sight resembles, likewise, very much, *Sadalus* (P. *Americus*). His description is not at all minute, and he says nothing of the cell, evidently finding the two other chief characters sufficient to separate the species from *Machaon*.

II. What of *Machaon* in these points?

1. There is an ocellus placed as in *Zolicaon*, and like it, fulvous and round, but without pupil; and the stripe or rim on marginal side passes round the fulvous spot and ends at or beyond the middle of the side which is farthest from base (fig. 9, 10).

2. The cell is yellow, with two black cross-bars, one about at middle, the other half way between that and the arc.

3. The body is yellow, with dorsum black; on the lower part of abdomen are two and four black lines or narrow stripes. Dr. Boisduval, Spec. Gen., 1,329, says of this species: "Body yellow, with a dorsal black band."

Other comparisons might be instituted, but these three points are sufficient.

1. That the ocellus of *Machaon* is blind will be gainsaid by no one. The species is thoroughly well-known. It flies all over the old world, unless in middle and south Africa. If an example were found possessing a black pupilled ocellus like that seen in *Zolicaon*, it would be exceptional, extraordinary. I have before me, as I write, several examples of *Machaon* from Europe and Asia, obtained for me some years ago by Mr. W. F. Kirby, with a view of getting all the prominent varieties of the species. I have also fifteen examples from the frontier of Thibet, and one of same type, sent long ago by Dr. Hagen, from Himalaya, and labeled *Asiaticus*, Mén. I have fourteen of the American form, var. *Aliaska*. All these, European to American, agree in respect to the fulvous, unpupilled ocellus, except that two from Southern Europe have it yellow, as do nearly all the Alaskans. The

American and Himalayan also have no violet above the fulvous or yellow spot.

In all these *Machaon*, and it is characteristic of the species wherever it is found, there is a black line on the outer edge of the fulvous spot, running down the inner margin of the wing; curving around the spot, it usually ends at considerably more than half way along the farther side (from base) of same. If it were continued from 30° to 40° farther (figs. 11, 12), it would strike the black band of the hind margin and close up the circle. I have no example in which a quarter circle would not fill this gap. This line is often not at all thickened at the end (fig. 10); in some cases it is reduced there to a thread (fig. 9), the reduction taking place abruptly as the line leaves the margin. In some cases the line is thickened at the end into a bulb (fig. 11) of varying diameter. In the American examples there are all these variations, just as in the others. The thickening spoken of, being at the end of the line, is on the lower edge of the fulvous area, and occasionally the bulb is severed from the line, as in one of my examples (fig. 12), and yet forms part of the circle. I call particular attention to this point.

Now, the circular pupil of *Zolicaon*, placed in the middle of the fulvous spot, so as to make a complete ocellus (fig. 4), never originated in a thickened section of the rim. Therefore, this character never was derived from *Machaon*. The pupilled ocellus of *Zolicaon* is as significant as the ocellus in wing of Satyrus *Alope*, or the eye-spot of Vanessa *Io*. It is because it is small that the importance of such a feature is apt to be overlooked. If it covered as much ground as the eye spot of Telea *Polyphemus*, for example, it would at once be allowed to present a specific difference, when compared with another Telea having a blind ocellus like that of *Machaon*. Looking over my examples of *Zolicaon*, one female is seen to have an isolated black pupil on the upper side, but on the other, the same pupil is joined to the black rim on the outer edge. It is pear-shaped, and the prolongation of its small end strikes the rim, above its terminus, on the middle of the side at the inner wing-margin (fig. 5). The butterfly I speak of is figured in But. N. A., vol. 2, plate of *Zolicaon*. Dr. Hagen says, p. 150, that among the *Zolicaon* examined by him, is one female from California, "with a continuation of the spot on the under side of the black stripe, which edges the inner margin. Mr. Edwards has figured, pl. 6, Papilio, f. 4, exactly the same for the female of *Zolicaon*, without mentioning it in the description." The Doctor refers in this way in order to show that one of the characters attributed to *Zolicaon* is variable in the direction of *Machaon*. If he can establish this point it will so far help to the assertion that *Zolicaon* is derived from *Machaon*. Undoubtedly the pupil in *Zolicaon* more or less often connects with the "black stripe which edges the inner margin," but that is quite another matter from a thickening of the end of the same stripe such as is seen in *Machaon*. In fig. 5 the apex of the pear-shaped pupil hits the rim in the middle of the outer side of the ocellus and the *rim is prolonged beyond the connection*. I call attention to this last point also, for these little things have a meaning. In *Machaon* the end of the rim or stripe is thickened on the side farthest from base, and this end is 90° to 150° further round the circle than the end of same stripe in *Zolicaon*.

Now, how came that pupilled ocellus to be a main feature of of *Zolicaon*, and a blind ocellus of *Machaon?* If *Zolicaon* is derived from *Machaon*, as Dr. Hagen declares, but cannot prove, how came in that persistent pupil, not found in the parent form? On the other hand, if *Machaon* is derived from *Zolicaon*, and, while guessing prevails, that guess is as good as the other, why do not examples of reversion occur? Why do we merely see a thickening of the end of the rim of the circle in *Machaon*, if there is any change at at all from a mere line, and never a pupil?

Without question, every mark on a butterfly wing is variable, and among thousands of examples of a given species, all sorts of varieties might be expected, *but within certain limits*. Something cannot come from nothing, there must be a point or mark, a line to base a variation on. A line may break into spots, or spots may coalesce into a line or band, or bands, by suffusion, may spread all over the surface of the wing. But we never need hope to find in any sport an entirely new mark on a clear ground. There will be no ocellus on Callidryas *Eubule*. Now, I know of no evidence that a pupil was ever seen on the fulvous spot in *Machaon*. If such an example had occurred every collector would have regarded it as a singularity. It would have been treasured, for all collectors are eager to secure any oddity, and, probably, an account of it would have reached one of the entomological journals. In which case, Dr. Hagen, who knows all about the literature of entomology, would certainly have seized upon it and made it conspicuous in his paper. He has discovered two instances in *Machaon* of a cell more or less black; one in a figure by Freyer, "which has the basal part of cell black, except a small paler spot near the base," p. 155; and one in a dwarfed butterfly in the Cambridge Museum, from Switzeland, "which has the basal half of cell black. That he says nothing of variation which shows a pupilled ocellus is the best proof possible that no instance of it is recorded, at least. If, however, such an ocellus ever did appear in *Machaon*, it would fall under what Darwin calls the law of analogous variation, where "varieties of one species mock distinct but allied species," to be explained on the "principle of allied species having descended from one primitive form." That is, it would be a case of reversion.

I think it highly probable, from various reasons, especially from the peculiarities of the caterpillar in its several stages and in its food plants, and also of the chrysalis, that a remote ancestor of *Machaon* did possess a pupilled ocellus. But if this was so, the pupil was lost so long ago, that, even by reversion, no one can now report an existing example. It is one of the chief points in all the descriptions, and all the figures of *Machaon*, that it has an ocellus without pupil.

2. The black cell in *Zolicaon*, the yellow cell in *Machaon*. I have never seen a *Zolicaon* from California, the metropolis of the species, which has a cell varying from the type. On the other hand, I have never seen a *Machaon* from Europe or Asia which had anything but a yellow cell. Of course, variations may sometimes take place in this character in these species; either the black may, by suffusion, run over the yellow, or yellow over the black. I think, by subjecting chrysalids to cold, I could bring about such varieties, as the colors run under such conditions in many cases. Dr. Hagen finds one instance of a *Machaon*, with cell black at base, another partly black, as before said; but such cases must be extremely rare. And a *Zolicaon* with a yellow cell would be a *rara avis*, as any collector knows.

3. The body of *Zolicaon* is black, with a lateral yellow band; of *Machaon*, yellow, with a dorsal black band.

I have received, during twenty years, a great many *Zolicaon* from California, and, as I carefully preserve for my own collection every variation from the type of any species, the collection to-day would show if there had been any noticeable variation in *Zolicaon* received by me. None such is present. I have applied to several correspondents for their experience. Mr. Henry Edwards, who resided a number of years in San Francisco, and collected butterflies indefatigably all over the State, writes me that *Zolicaon* is very common about San Francisco, that he has not in his collection now, nor does he remember to have seen, an example in or from California which did not possess the three characters I rely on. Mr. B. Neumoegen, who has one of the most extensive collections of American butterflies yet made, knows of no example off type from California. Mr. E. M. Aaron, of Philadelphia, has examined three collections in that city, at my request, one being his own, and one that of the Ent. Soc., of which he is the Curator, with the same results. So that *Zolicaon*, in its metropolis, is remarkably constant to type.*

It is *because Zolicaon is not derived from Machaon* that it presents the remarkable features we are treating of. Where then did they come from? Now, every member of the *Asterias* group which I have seen, and I have before me, as I write, all the species enumerated by Dr. Hagen, except *Pergamus*, (which is represented by an unique specimen in the collection of Mr. H.

---

* While this paper is passing through the press, I have a reply also from Mr. W. G. Wright, of San Bernardino, to whom I wrote on same subject. All his examples of *Zolicaon* are characterised by black bodies, black cells, and pupilled ocelli. He sends me seven of them, and they are all true to type.

Edwards, who described it, and this agrees with the others), has precisely that pupilled ocellus of *Zolicaon*. Not only that; as the pupil varies in *Zolicaon*, so do the pupils in all these species vary. They are larger or smaller, circular or oval, or sub-oval; exactly in the centre, or a little out of centre. And about one-third the examples of each species, where I have several, show exactly the connection between the pupil and the rim which Dr. Hagen calls attention to; and it is usually in the female, on the under side. On the plate of *Brevicauda*, in But. N. A., this peculiarity is shown on under side of male (f. 2). On the plate of *Bairdii* the same is shown in both sexes. The rim runs past the point of connection, which is on the middle of the side on inner wing margin. And just as *Zolicaon* agrees with the *Asterias* group in the pupilled ocellus, so does it in the black cell. That is a special characteristic all through that group. So all the *Asterias* group, unless it is *Americus* female, have the body black. *Indra* has it wholly so, except that in the ♂ there is a bit of yellow on side next last segment; the female has an indistinct stripe of same along the side, distinct at the end. *Asterias* and *Brevicauda* and *Bairdii* have two and three rows of yellow dots on either side of abdomen, which otherwise is black. So does *Americus* male show one of the same lines of spots, the sub-dorsal, while the lower are suppressed. There it is! To get the nearest ally of *Zolicaon*, in the matter of its three chief characteristics, we have to go to a group distinct from the *Machaon*, and there we find not merely the same characters, but in the most important of the three, the ocellus, exactly the same modification of it. Plainly enough, *Zolicaon* has a close connection with the *Asterias* group, and it is open to assert that the two are descended from a common type, which was characterized by a pupilled ocellus, a black cell, and probably, by a black body. I do not think that any one who believes in the derivation of existing species from antecedent ones will refuse to admit that. The ocellus in *Zolicaon* tells its story as clearly as do the bars on the wing of a pigeon. The different species of the *Asterias* group form one branch, and *Zolicaon*, with perhaps *Americus*, another branch, from the same stem; though it may well have been that at one or more steps farther back, this stem and the one from which the *Machaon* group descended found likewise a common ancestor. But *Zolicaon* has no present relations with the *Machaon* group, standing wholly apart from it.

That *Zolicaon* has come to differ from the *Asterias* group in respect to the yellow side-stripe is not more than might be expected if it branched off at all. This stripe would not originate by the introduction of a new character, but by the modification of one already there; to wit, the two lines of yellow dots, one at the verge of the dorsal area, the other on lower half of side. The side stripe of *Zolicaon* occupies the space corresponding to that limited by these two lines in *Asterias.* We see a modification of the *Asterias* marks in *Indra*, where the yellow dots are suppressed, and in the male a dash of yellow is applied to the side at the last segment; in the female the dash is extended obscurely the length of the abdomen. If it be alleged that, although *Machaon* and *Zolicaon* differ in these three important points, yet they resemble each other in certain other points, just as important; viz, in the size and arrangement of the yellow spots on fore wings, and in the yellow base and disk of hind wings, in both which respects they differ from *Asterias*, I would say:

1. The marginal yellow spots of these several members of the *Asterias* group are very similar to those of *Zolicaon* on both wings and occupy the same positions.

2. The spots of the discal or interior band in the *Asterias* group occupy the same positions on the wings as do the discal spots of *Zolicaon* and *Machaon.* In these two species the spots spoken of are elongated, but *Bairdii* has them much more elongated than *Asterias*, and *Americus* still more. Indeed, this last is very close to *Zolicaon* in this respect. The spots are long, pear-shaped, instead of four-sided, but they cover nearly as much of the surface as do those of *Zolicaon.** And what is especially interesting in some examples, is that the whole of the base and disk of hind wings in *Americus* is yellow just as in *Zolicaon.*† We have seen that Boisduval was struck with the resemblance between these two species. Yet, surely, *Americus* stands very near the other species of the *Asterias* group. It has the ocellus, the black cell, and the male has the upper row of yellow dots on body just as in *Asterias.* In the examples before me, the lower row is wanting, and over the side to base of abdomen is a thin coating of yellow, not wholly concealing the black ground. I have 1 ♂ 2 ♀ taken in Arizona and both females have the side yellow-banded. But the bodies are in so crushed and rubbed a condition that I cannot pronounce more definitely on the marks or color of abdomen than this, that the sides are certainly yellow. The male is in exellent condition, and possesses another resemblance to *Asterias* in the orange color of the marginal spots on hind wing below, and in orange on the yellow ground next the black marginal band, in all the interspaces. The spots of the discal band of under fore wings are also orange, as in *Brevicauda.* I have two ♂ from Panama, and Mr. Neumoegen has sent me 1 ♂ from Chiriqui, and the three agree with the Arizona ♂, except that they all have the base of hind wing black. So that we have in *Americus* a species which stands between the *Asterias* group and *Zolicaon*, and which is

---

* In the figure of *Sadalus*, by Lucas, Pl. 10, Rev. et Mag. Zool., 1852, apparently a male, these spots, except the two lower ones, are narrow, and lie isolated in the middle of the black interspaces. But in all the examples of this butterfly which I have been able to examine, all the spots of the series are large and pear-shaped, and in breadth extend from nervule to nervule. The female has them larger than the male.

† There is a variation in this respect, some examples having the hind wings crossed by a broad yellow band, the base being black: while the others have the yellow quite up to base.

variable in one important character, the extent of the yellow area of hind wing; some examples resembling therein some members of the *Asterias* group, *Indra* and *Bairdii*, while others resemble *Zolicaon*. But the sum of resemblances between *Americus* and *Zolicaon* is greater than between *Americus* and any other members of the group, and the two fall most naturally into a subgroup. And the remaining species belonging to our fauna naturally fall into other sub-groups; as, 1, *Brevicauda;* 2, *Asterias; Bairdii;* 3, *Indra*. I do not believe that any one of these subgroups has been derived from another, although I have shown how the side stripe of *Zolicaon* might have originated, if there were derivation. I would have every sub-group of equal rank, as alike sprung from same ancestor.

II. We now come to *Oregonia*. This species has a close resemblance to certain Asiatic forms, which may or may not have sprung from *Machaon*, especially *Hipprocrates*. The reverse is just as likely, and indeed, more likely, in my opinion, if there was derivation anywhere. The fore wings are largely produced and their hind margins are incurved. The tails are longer in proportion than typical *Machaon*. On the under side, the whole surface is yellow, just as in *Machaon*, the cell of fore wings just the same, the abdomen the same, yellow, with yellow stripes. The most striking distinction is found in the anal ocellus. As in all these species we have had in review, the ocellus is fulvous, but *the rim comes down and ends as in Zolicaon, not as in Machaon*, which has it continued farther by a quarter circle and more; and right at the end there is a bend at right angles, and a continuation of the line is thrown across the fulvous spot a little below the middle thereof. The figures 6, 7, 8 show the peculiar character of this line or mark, and all are copied from But. N. A., plate of *Oregonia*. In fig. 6, under side ♂, we see a tapering, slightly wavy stripe, ending in a point. This simplest form I assume to be the normal one. In fig. 7, under side ♀, there is a modification of the plain stripe, in a long narrow club, reaching quite across the fulvous spot. Fig. 8 represents the upper side of the same female, and the thickening is greater, and the mark, as in other cases, is very long and tapers gradually. Now, this is altogether another sort of mark from the black pupil of *Zolicaon*, whether the latter stands alone in the centre of the field, or whether it strikes the rim. It is the modification of a stripe across the ocellus. Dr. Hagen states, in his specifications of what he thinks is *Oregonia*, p. 151, that "the spot is connected," etc; so that it does not appear that it is ever severed, or ever takes a different shape from that indicated in the figures.* In that mark *Oregonia* is curiously near an occasional *Asterias*, as seen in fig. 3; also, perhaps, still nearer to *Bairdii*, as seen on the plate in But. N. A., fig. 4. That is the single approach which *Oregonia* makes to the *Asterias* type, and here is another hint of a remote common ancestor. *Oregonia* certainly never got that peculiar mark from *Machaon*. To show the two together is sufficient. No large number of the former species have yet been taken, but this mark is constant so far, and no case of reversion to a blind ocellus with a *Machaon* rim is reported. On the other hand, no evidence is forthcoming that the *Oregonia* style of ocellus ever has appeared in a *Machaon*, and on both sides there would be cases of reversion had there been derivation.

---

* In the original description of *Oregonia*, I said, "anal spot small, yellow below, fulvous above, with a rounded black spot in the middle, and which is connected with the narrow black edge of the margin." I should have said; "with a stripe or a club-shaped spot connected, etc." For my abominable carelessness I stand myself on the stool of repentance and apologise humbly to all concerned; and I thank Dr. Hagen for leading me to study these species as I had not done before.

I do not at all understand why Dr. Hagen did not see fit to institute a careful comparison between the larvæ of *Zolicaon* and *Oregonia*, and both with *Machaon*. All the materials were at his hand, so far as relates to the final stages of the several caterpillars. He says the party took two mature larvæ of *Oregonia*, one of which Mr. Stretch carried to imago, "which proved to be *Oregonia*.[*]

Inasmuch as Mr. H. Edwards has this imago and says it is *Oregonia*, I accept the statement. The relation proceeds: "The caterpillar is very similar to that of *Machaon* in *form*, *color and pattern*. As I am very well acquainted with the latter, I directly remarked a difference," specifying a single difference in the cross band of second segment, and nothing more. Now, the facts are these: *Asterias*, *Brevicauda*, *Zolicaon* and *Machaon* have their mature larvæ similar in form and color. Therefore, these two features in the comparison may pass for nothing. As to pattern, it is another matter. Fortunately, I have the colored figure of one of these *Oregonia* caterpillars, by Mr. Stretch, who also made the figure of *Zolicaon* caterpillar given in But. N. A. And both the original drawings lie before me. I have a colored figure of the same stage of *Machaon* (of course, typical), executed for me expressly, by Dr. Weismann himself. And I say, that this *Oregonia* larva differs decidedly in the pattern of the markings from either of the other two. *Zolicaon* and *Oregonia* differ between themselves, but both are nearer to *Asterias* than to *Machaon*. I intend to figure the larva of *Oregonia*, in Part XII, But. N. A., Vol. 2, this spring, and on same plate I will put this larva of *Machaon*. Till then I must ask my readers to take my word that they exhibit striking and specific differences.[†]

---

[*] All through the paper the Doctor persists in calling this species *Oregonius*, "*Oregonius*, not *Oregonia*, as Mr. Edwards writes," p. 151. I shall file a caveat to protect the name I christened this species with. Why does the Doctor not talk about *Aliaskus?* When I give a species a name I expect it to travel under it henceforth.

[†] Dr. Hagen gives us much lore about the larva of *Machaon* from the books, to make good his proposition, that, as the imago shows a large variation in color, so the caterpillar and chrysalis "also differ considerably." But the only deviation from the green and typical mature caterpillar shown is a black form, which occasionally appears. That is, the black color of the larval stages which precede the last stage is projected into that; a kind of variation that might be expected. None of the cases cited at all concern *Oregonia* or *Zolicaon*.

III. That *Zolicaon* never could have been derived from *Oregonia* or the reverse follows from the position of the two species in two distinct groups. The latter species is unmistakably allied to the *Machaon* group, the former to the *Asterias* group. I have shown this, and the proposition needs no farther remark.

We now come to the "intermediate forms," which Dr. Hagen would have us understand are intergrades between *Oregonia* and *Zolicaon*. If I have established the position that *Zolicaon* belongs to the *Asterias* group, or at any rate, is nearest to that, and is removed from the *Machaon* group, and I think Lepidopterists will agree that I have, then, inasmuch as it is conceded on all hands that *Oregonia* is a member of the *Machaon* group, these forms cannot be intergrades, because the product of two species is not an intergrade. (I would say here that I have seen none of these famous examples, though more than once, and long ago. Dr. Hagen promised to send me them. I am not at all certain that if I were to see them, I should agree with the Doctor in regarding them as particularly connected with either of the species spoken of, but at present, I have to be governed by what he has told us).

Dr. Hagen tells us that he found all these nondescripts, (with yellow abdomen and black cell; black abdomen and yellow cell, etc.), in a certain district east of the Cascade Mountains, which he says possesses a very different climate from the district to the west of these mountains, "the latter being similar to that of California." He tells us that it is a sage-brush desert, with the least rain fall of any part of the United States, and the heat is excessive, "more than a week above 100°," "where nearly no rain falls through the summer, a sage-brush desert on basaltic soil."

The typical *Zolicaon*, as before said, is common throughout California. It also flies through Oregon, and, at least, into Washington Territory to the west of the Cascade Mountains. Dr. Hagen took half a dozen, true to type, east of these mountains also.

On the other hand, the typical *Oregonia*, with yellow cell, yellow body, and striped or clubbed ocellus, had alone been seen before this excursion into the sage-brush desert. Its habitat, so far as known, was in Western Oregon and Washington Territory. Mr. H. Edwards had also taken one example of *Machaon*, var. *Aliaska*, at the Dalles, W. T.

Taking the relation of Dr. Hagen, just as he gives it, I see no alternative but to assert that he has had the good fortune to fall in with a lot of hybrids in this secluded and infernal sage-brush desert. There is no improbability in this. No one accuses Colias *Philodice* of being a variety of Colias *Eurytheme*, at least, no one has hitherto done so, for I am not at all certain that our friend herein concerned does not embrace both these in one of his three or four species; but I have several orange Colias, which appear to be hybrids, and in two instances undoubted males *Eurytheme*, one of them fiery-red, the other pale, or the *Keewaydin* form, and two yellow females *Philodice*, with which they were taken in copulation. As the red one was so taken by Mr. G. M. Dodge, who gave it to me, there can be no question of the fact of the capture. From what I know of the frenzied eagerness with which certain male butterflies (as I have related in the cases of Papilio *Ajax*, Can. Ent., 13, 209, and Heliconia *Charitonia*, Papilio 1, 213), watch the coming of the females from chrysalis, I am confident that they would seize upon the females of any allied species just as readily, if one of their own were not at hand. If such things occur in the mild climate of the Mississippi valley, where females of *Eurytheme* are as common as the males, what may not occur in a sage-brush desert, with no rain fall and the mercury above 100°? The panting male cannot fly over hill and valley, under these conditions, seeking its mate, as we often see male butterflies doing in a Christian country. Nature impels him, and he captures the first female he meets. That this is the fact in multitudes of cases in that arid district is highly probable, and it will account for all these curious nondescripts taken by Dr. Hagen.

My summing up is this: 1. *Zolicaon* is a species subject to little variation. It is a member of the *Asterias* group, forming with *Americus* a sub-group. The other species of the group are divisible into two or more sub-groups, and all these are of equal rank, sprung from a common ancestor.

2. *Oregonia* belongs to the *Machaon* group, and (perhaps with some other species) forms a sub-group of equal rank at least with the sub-group to which the species *Machaon* belongs. It certainly cannot have been derived from the species *Machaon.*

3. *Zolicaon* and *Oregonia* being distinct species, in distinct groups, the supposed "intermediate forms" discovered by Dr. Hagen, in a limited and exceptional district, are not intergrades, but, unless they constitute a distinct species by themselves, are of necessity hybrids, and probably between *Zolicaon* and *Oregonia* (and, perhaps, *Aliaska*).

And, finally, that the grand propositions enunciated by Dr. Hagen: 1. That *Oregonia* and *Zolicaon* cannot be separated: 2. That these forms should be considered as local or climatic varieties of one and the same species, *Machaon*, fall to the ground. *Req. in pace.*

In such cases as that of *Oregonia*, where a well-marked species is only found to exist in a much-restricted area, while its nearest allies flourish exceedingly and occupy a large territory, I hold that the former come of a high antiquity. Any form sprung from an existing one would never have attained specific rank unless specially favored, and it would flourish at the expense of the parent form. It is because of its powerful vitality that it alone has survived, when all other varieties and any intermediate varieties have perished. Of the class indicated, are Papilio *Brevicauda*, confined to Nova Scotia, Newfoundland, Anticosti and the adjacent main land only, while *Asterias* flies all over North America, to the south and west of these regions, even to Panama; Satyrus *Pegala*, confined to the vicinity of the Gulf of Mexico, in our Southern States, while Satyrus *Alope* flies universally outside that district.

In my experience in breeding butterflies from the egg, and all the years since 1870, I have done it largely, while dimorphism or polymorphism have, in several cases, been established between forms where some sort of connection had been suspected, but of what nature no one could tell, and while what many had supposed to be mere varieties, have turned out to be distinct species, differing in their larval characters decidedly from the supposed parent, yet I do not recollect one instance where the reverse has taken place, and a form with marked characters, which I had assumed, on the strength of the imago only, to be a species, has turned out by breeding to be a mere variety. And yet, on the lumping-of-species theory, that ought constantly to have occurred. The fact is, I apprehend, that a marked difference in the imago carries with it a marked difference in the larva, at least in all species which have larval characters definite enough to seize upon. Even Dr. Hagen observed, and calls attention to, a difference between the larvæ of *Oregonia* and *Machaon*, and, as before stated, he might have found more if he had looked farther. The Doctor even has discovered, p. 160, that there are "differences in the finishing of the detail" of the genital apparatus of the males in the same two species. No doubt there are, and certainly there ought to be.

This paper is already so long that I can add but a few lines about the var. *Aliaska*, and its right by priority to give the name to the Himalayan form of *Machaon*, which has been called *Asiaticus*, Ménétriés, but incorrectly, which right Dr. Hagen disputes. I am not a stickler for priority in names, as is known, and I have long held that a Resolution should be passed by entomologists in convention, by which twenty years undisputed use of a species name should give it a good title. Under this Rule, if it could be had, *Asiatica* (not *Asiaticus*, for the other is the name Ménétriés gave the species), would certainly prevail, both for the Himalayan and the American form, unless where more is known of the latter, greater differences appear than we now discover. But, as M. Ménétriés saw fit to restrict his name with the utmost precision to what is now seen to be a mere aberration, I cannot help it. The name *Aliaska*, Scudder, under the present Rule, applies equally to the Himalayan form. Ménétriés says his var. differs from *Machaon* in the one character, a broad marginal border to hind wing, the inner edge of which is straight (*droite*, in italics in his text). As he left it, we have to accept it.*

NECESSARY RESTITUTION OF THE NAMES GIVEN BY TH. W. HARRIS TO TWO NORTH AMERICAN SPHINGIDÆ.

By Dr. H. A. Hagen.

The arrangement of the biological collection of the Lepidoptera obliged me to compare carefully the literature to ascertain which names I have to adopt. It seems to me that among the Sphingidæ two North American species, first described by Th. W. Harris, should retain his names. *Ceratomia quadricornis*, described 1839, has been changed to *C. amyntor*, Hubn. This species is figured by Huebner Samml. exot. Schm. Vol. III. (not Vol. II., as it is quoted by Messrs. Grote and Robinson, p. 16, which error is repeated by Mr. A. G. Butler, Sphingidæ, p. 621). The date of the plate containing "*Agrius Amyntor*, Pennsylvania," is not sure, but certainly later than, as quoted by Messrs. Grote and Robinson, 1806–1824, and by Mr. Butler, 1806. This plate is No. 46 (numbered by pencil) in the copy of Vol. III. of the Harvard Coll. Library of the fifty-three plates forming the whole volume here and in von Heyden's Library in Frankfort o. M., Europe. Geyer's Necrolog. of Huebner, in Thou's Archiv F. I, p. 30, states, July 1, 1827, that the Samml. exot. Schmetterl. contains 439 plates. These plates form Vol. I. and Vol. II., but the copy before me, and others compared in Europe, contain only 438. Geyer states further that he has decided to continue the publication of Huebner's works; but in 1827, the plate with *A. Amyntor* had not appeared. Further, on the original wrapper (in the library in Berlin) Sammlung Europ. Schmetterl., Horda, Vol. VII., 1834, Mr. Geyer states that for the Vol. III., Samml. exot. Schmett. "are now ready thirty-one plates." As *A. Amyntor* is plate forty-six, it is published only *after* 1834, and in any way is not *Amyntor* of Huebner, but of Geyer. Perhaps it may even not antedate Harris.

It is a rule, everywhere accepted, that a figure even named can never antedate a description. Therefore, Mr. Harris, who knew that the copy in Harvard Library arrived here July 20, 1849, has, in a copy of the catalogue of N. A. Sph., presented to Prof.

---

* In my paper on the American form of P. Machaon, in this Magazine for May, 1882, I stated that the black parts in var. *Aliaska* were more intensely colored, etc., than the old world types, but I made an exception in favor of the Himalayan, saying of these, they "resemble the American in this respect." Dr. Hagen says of my statement, p. 157, that it "is not true." "The large material before me proves this statement *for the Himalayan specimens*, and even for some European ones, to be incorrect." The Doctor misapprehended me.

L. Agassiz, and which contains a few notes in his hand, not changed the name of *C. quadricornis.* He has changed his *S. Carolina* to *quinquemaculata* and says of *G. epimenis*, that "it is probably a species of Brepha." Therefore, *C. quadricornis* has to be retained, as Huebner had nothing in any way to do with this species.

Of *Sphinx cinerea* Huebner, Vol. II., gives only a figure with the name *Lethia chersis*, not even the locality. Therefore, Harris' name has to be restored.

Of neither of these species is any description whatsoever given by Huebner. In his Verzeich., 1815, *L. chersis* is not mentioned, therefore, the plate must have been published after this year.*

THE CAPITALIZING OF SPECIFIC NAMES.

To the Editor of "PAPILIO:"

Can the editor of "PAPILIO" inform me upon what ground and for what purpose American lepidopterists have recently adopted the vicious habit of capitalizing the specific names of their insects? The tendency among entomologists, generally, has been in the other direction of using a lower case letter, even when the species is named after some individual or, in other respects, may be looked upon as a proper name. The prime object of nomenclature being to facilitate study and thought, this last fashion has everything in its favor. The capitalizing of specfic names is almost as bad and fully as unnecessary and confusing as the use of the lower-case letters which has come into vogue among some catalogues. I am led to ask the question upon reading recent articles by Mr. A. R. Grote, in which generic and specific names are often used singly and in each case capitalized, so that none but those few who are entirely familiar with the terms can know whether genera or species are referred to, except by guessing or laborious reference. If there can be any sound defence of the custom I should like to know of it.

C. V. RILEY, Washington, D. C.

CONCERNING SO-CALLED TEMPERATURE FORMS OF BUTTERFLIES.

BY ARTHUR G. BUTLER, F. L. S., F. Z. S.

I have read with much interest a paper by Dr. Hagen, "On Papilio machaon L., and its North American representatives, etc." and, considered from a Darwinian point of view, it is undoubtedly valuable, as bringing into a small compass much relating to *P. machaon* and allies that has hitherto been widely scattered, it helps to prove what we evolutionists have long believed, that *P. machaon*, *hippocrates* and allies are all descended from a common stock; but it does not and cannot prove that *P. machaon*, under any condition of temperature, would ever produce *P. hippocrates* or *P. rutulus*.

---

* Since writing this paper I have learned from a correspondent in Europe that in Senator von Heyden's copy of Huebner, received by him from Geyer himself, this plate is marked "published 1838 by Geyer. H. A. H.

Mr. Pryer, of Japan, for whom I entertain the greatest respect as an essentially *field* naturalist, certainly makes a statement about the size of March specimens of *P. hippocrates*, which is so astounding that I can only regard it as a slip of the pen; 2½ inches in expanse would be very small indeed for European *P. machaon*, most examples of which exceed three inches. I have examined a great number of specimens of *P. hippocrates*, taken by collectors who have lived in Japan for years, and the difference of size has only varied from 4¼ inches in the males to five inches in the largest females. I do not mean to say that you could not starve them into smaller insects, but, as a lepidopterist, who has seen probably more Japanese Lepidoptera than any man not living in Japan, I must be excused if I believe that Mr. Pryer has forgotten to double his measurement or has, at least, written a 2 for a 3 in the note upon this species.

If, however, we were unquestioningly to accept the statement that some examples of *P. hippocrates* were smaller than the European species, it would not alter the fact that the former, with its more-produced primaries, the broader dark belt of secondaries, the inner edge of which is scarcely undulated (unlike the European insect) and its usually melanistic female is confined to Japan, and *P. machaon* to Europe, and has no more claim to be called the same species than the *Gonepteryx aspasia* of Ménétriés, with its acute falcate primaries, has to be regarded as identical with the broad-winged *G. nipalensis* (a specimen of which we have from Nikko, which Pryer confounds with it.*

Does Dr. Hagen expect us to associate as conspecific all forms descended from a common ancestor? If so, all naturally constituted genera may be called species, and all species representative forms; but *cui bono?* the species will exist, by whatever terms we know them. I will not say "a rose by any other name, etc," because Dr. Walsh argued forcibly against the truth of that statement, but I will say this, that nothing will be gained by the change.

Now, as touching the species of *Terias*, associated by Pryer, and for which, as he considers that too many names have already been proposed, he suggests another, with a view to cure the evil on the homœopathic plan. It may, perhaps, surprise Dr. Hagen to hear that, of the eleven in that list, only five occur in Japan; and, therefore, that six are admitted on the authority of other entomologists, who had made no special study of the genus; of these, *T. hecabe* is a Chinese species, ranging to India and Australia. It is always of a deep chrome-yellow color in the males, the under surface is frequently immaculate and never more heavily marked than its near ally *T .mariesii*. *T. mandarina* occurs both in China and Japan, and in the latter evidently crosses with *T. anemone*, as that form does with *T. mariesii*, and here arises a distinct question. Are we to reject the specific distinction of well-marked forms, because when brought together, they will interbreed? There can be little doubt but that species, originally locally distinct, but the ranges of which have gradually been extended, are sometimes fertile inter se, and also, that hybridization between such species or "representative forms," carried on for many generations, produces a tendency to throw out gradations of form between the original parents, even in the progeny from a single batch of eggs. This is certainly the case with the silk-moths of India and Japan, which, according to the statements made by collectors, borne out by the collections sent home, are true to locality, until brought together for sale in the market, and thus subjected to the probability of hybridization.

---

* I did, indeed, once receive a specimen of typical *G. rhamui* from Yokohama, I believe Mr. Pryer sent it in a collection which I received from Mr. Fenton; I recognized it at a glance as British and this was admitted by Fenton and (if I mistake not) by Pryer also.

But to return to Pryer's list, *T. sinensis* is probably *T. rahel* of Fabricius and belongs to a totally different section of the genus from *T. hecabe*. Mr. Elwes can never have read Lucas' description, or I cannot believe that even he, (notwithstanding his very broad views respecting the variation of *some* species) would have suggested the union of two forms so utterly dissimilar in all that constitutes a specific difference.

T. mariesii is, as I have said, the Japanese representative of *T. hecabe*, but not, therefore the same species. *T. anemone* is a form, perhaps, a species occurring rarely in China, and commonly in Japan. *T. connexiva and hybrida* are admitted hybrid varieties. *T. æsiope* is a N. E. Himalayan species or, perhaps, a race of *T. hecabe*, about equally distinct to *T. mariesii*. *T. hecabeoides*, on the other hand, is a N. E. Himalayan species, readily distinguishable, both from *T. hecabe* and the whole Japanese crew, by having a brown transverse patch on the under surface of primaries towards the apex. *T. brenda* is a very distinct and purely African species, having a white female. It is entirely unlike any form ever existing in Japan, and, lastly, *T. sari* belongs to a distinct sub-section of the genus in which the under surface of the primaries is marked with a large, square, apical brown patch. Hitherto it has only come from Java, Malacca and Borneo. Its female is characterized by the obliquely cut sinuation of the external border of primaries. *T. sari* is, in fact, nearly allied to *T. silhetana*, but is not nearly related to *T. hecabe*. In conclusion, I have no hesitancy in saying that if Mr. Pryer could see the species of *Terias* associated in his list under the name of *T. multiformis*,* figured together on one plate, he would laugh at his own credulity.

NOTES ON LEPIDOPTERA.

RARE SPHINGIDÆ. I have taken the following rare species at this place. *Arctonotus lucidus* at light, January 7 and 28, *Pterogon Clarkiæ* on flowers of wild turnip, March–April, *Sphinx Sequoiæ*, hovering over various flowers, April, *Sp. perelegans*, about various flowers, June. J. J. RIVERS, Berkeley, Cal.

WILLOW A FOOD PLANT OF PAPILIO RUTULUS. On August 29, 1879, I received from Mr. O. T. Baron, in Northern California, an egg of *Rutulus* in alcohol, which egg Mr. Baron informed me he saw the female deposit on willow; a remarkable food plant for a Papilio of this group. W. H. EDWARDS, Coalburgh.

DAREMMA HAGENI. In my paper in December "PAPILIO" I incorrectly gave Kansas (Snow) as a locality for *Daremma Hageni*, Gr. The material I examined came from Texas (Boll), the original habitat of the species, which has not occurred in Kansas yet. I must have misunderstood the statement made to me when I saw the specimens upon which I based my statement. The species seems to be only known from Texas, but is probably found elsewhere in the Southwest. A. R. GROTE.

BIOLOGICAL COLLECTION IN CAMBRIDGE MUSEUM. Perhaps it may be not out of place to make a general statement concerning the biological collection of the Lepidoptera in the Museum. When first arranged, about ten years ago, the number of species, more or less fully represented, exceeded 1200. The very numerous additions since this time made a new arrangement unavoidable. The Diurna now completed show 200 species. The Sphingidæ, now in way of arrangement, are surprisingly rich. and the Bombycidæ, Noctuidæ and Geometridæ even much more so, so that, probably, the final number will exceed considerably 3000 species. For the Micros the additions have been only small. Of course, anything that collectors may have to spare in the wáy of transformations will be thankfully accepted, in exchange or otherwise, as it is my intention to make this part of the collection as rich as possible for the benefit of students. H. A. HAGEN, Cambridge.

LOCALITIES OF BUTTERFLIES. In the Nov.–Dec., 1882, number of PAPILIO appeared descriptions of Thanaos *Tatius* and T. *Clitus*, with no mention of locality. The paper was sent on to be incorporated with the one which appeared in the October number on the new species taken by Mr. Morrison at Fort Grant and Graham Mountains, Arizona, but arrived too late. Hence the omission of the locality. Both these Thanaos were taken on Mt. Graham. W. H. EDWARDS.

---

* **Which name, having no type, can be quietly ignored.**

PAPILIO.

Organ of the New York Entomological Club.

Vol. III.] April, 1883. [No. 4.

LIST OF APATELÆ BELONGING TO THE GROUPS ACRONICTA AND TRIÆNA.

By A. R. Grote.

Genus APATELA, Hubn.

Sub-genus *Triæna*, Hubn.

The type is the European *Psi*, with which our *Occidentalis*, etc., seem strictly congenerical.

1. OCCIDENTALIS, G. and R., Proc. Ent. Soc., Phil., 6, 16. The larva is described by Mr. Saunders and Dr. Packard, PAPILIO, 2, 181. "Western Dagger." Represents the European *Psi*, which is, perhaps, dimorphic in the larval state. Thaxter (PAPILIO, 3, 17) gives "elm." I have a figure of the larva on "apple," which agrees with Dr. Packard's description.

2. MORULA, G. and R., Tr. Am. Ent. Soc., 2,196, pl. 3, fig. 75; Lintn. Ent. Con., 3, 137 (larva on "apple). Disk of thorax ochrey. This is much larger and ochrey-tinged and paler, faded, compared with *Occidentalis*. "Ochre Dagger," Thaxter gives the larva also on "elm."

3. LOBELIÆ, Guen., Noc. 1, 44; Coquillet, PAPILIO 1, 6 (larva). On "burr-oak;" M. Guene describes it as "Lobelia" from Abbot's drawing. The largest of the group. Texan specimens stained with ochrey. "Large Dagger."

4. HASTA, Guen., Noct. 1, 45. Smaller than *Lobeliæ*; dark; fore wings blue-gray, hind wings dark. "Smoky dagger." Larva unknown.

5. FURCIFERA, Guen., Noct. 1, 44. Size of *Hasta*, hind wings pale, fore wings washed with white. "Forked dagger." Larva, according to Thaxter, on wild cherry.

My identification of these two species is taken from the Species Generale. I have seen no types. *Telum* and *Spinigera* are unknown to me, but must resemble these. Some one has labelled specimens of *Xylinifornis* and *Pallidicoma* (both of which

I would refer to *Mastiphanes*) as "*Spinigera*," in different collections. *Interrupta*, Bdv., is founded on a drawing by Abbot. It is described as smaller than *Psi;* the moth may be *Grisea-Pudorata*); the caterpillar is flesh color, with red tubercles, surmounted with tufts or whorls of hair.

6. THORACICA, Grote, N. Am., Ent.. I, 94. Colorado. The disc of thorax is discolorous; the insect is nearest, perhaps, to *Furcifera*. Larva unknown.

7. TRITONA, Hubn.. Zutr., 107–0; Guen., 1, 42. This is small, with dark blue-gray primaries and brown hind wings. Larva unknown. "Brown dagger."

8. GRISEA, Walk., C. B. M., 56, *Pudorata* Morr. Ann, N. Y. Lyc., 83, 1875. Like *Tritona* in size and form, but pale gray with whitish secondaries. Larva unknown. "Pale dagger."

9. FALCULA, Grote, Can. Ent., 9, 8, 6; Coquillet, Papilio 1, 6. This differs from *Tritona* by the bright brown edging of the thoracic tuft behind; the external margin is a little drawn in below apices; the dash at internal angle does not cross or indent the transverse posterior line, in which it resembles *Parallela*. Larva on hazel. "Edged dagger."

10. PARALLELA, Grote, Can. Ent., 9, 5, 3, Colorado, Texas, small, with pearly-white secondaries. A very pretty and distinct species. Larva unknown.

11. ALBARUFA, Grote, Proc. Bot., S. N. H., 239, 1874; *Walkeri*, Andrews Can. Ent., 9, 98. Larva unknown. The hind wings of male are white; of female fuscous. This species is known by the red and pale discal stigmata. "Red and White Dagger."

12. PAUPERCULA, Grote, Proc. Ac. N. S. Phil., 197, 1874, Texas. Larva unknown. Fresh specimens are olivaceous in tint.

13. VINNULA, Grote, Proc. Ent. Soc., Phil., 2,436, pl. 9, fig. 2, Canada to Middle States, "Olive Dagger." I am rather doubtful of this little species really belonging to *Triæna* (*Samaphona* Guen.). It is distinctly olivaceous in color; it does not show the usual marks. Mr. Thaxter reports the larva on elm. I have seen no description of it. These are all I would now refer to this section of *Apatela*.

Sub-genus *Acronicta*, Ochs.

1. LEPUSCULINA, Guen. Noct. 1, 46; *Populi*, Riley, 2nd Mo. Rep. 119. Larva on poplar. Larger and stouter than the European *Leporina*, but belonging to this group with *Leporina* and *Vulpina*. Its range extends beyond the Mississipi and, perhaps, across the Continent. "Poplar Dagger."

2. FELINA, Grote, Bull. U. S. Geol. Surv., 5, 208. California. Larva (Pacific Coast Lep., 68) described by Mr. Hy. Edwards on poplars. Replaces on the West Coast our Eastern *Lepusculina*; the imagines differ but slightly, as far as observed.

3. VULPINA, Grote, Can. Ent., Jan., 1883; Thaxter, PAPILIO

Jan., 1883, p. 14, described larva on birch and poplar. This is the true "representative" of *Leporina*, quite distinct from either of the above in all stages. "Birch Dagger."

4. TOTA, Gr., N. Am. Ent., 1, 10, Texas. This may not belong here, and these are all the N. Am. typical *Acronictæ* known to me. The range of *Felina* (No. 2) may include Colorado. Not enough material has been examined of this Western species.

I am disinclined to place *Insita* with *Acronicta*. This form should rather follow *Americana* and *Dactylina* under *Megacronycta*. The final arrangement of our *Apatelæ* must be arrived at after all the stages are known. Mr. Butler's paper on the genus was striking, but I am not prepared to follow conclusions based on one form of the species alone. *Apatela* is a group or genus in which the larvæ have submitted to independent variation; the gray color of the perfect insect and its streaked pattern of marking has been found useful and is preserved; this is apparent from a study of the larvæ of *Psi*, *Tridens* and *Occidentalis*. Dimorphism in the larva is a break in the direction of a distinct cycle of reproduction. In the two European species the break is considered to have proceeded far enough to warrant a title; but is this really so? I have not in literature seen that *Psi* and *Tridens* have been studied sufficiently. It must be proved that there is a want of connection between the two sets of larvæ. Like *Basilarchia* in the butterflies, we have in *Apatela* a rich ground for collecting facts bearing upon the natural rise of "species." I must highly commend Mr. Thaxter's recent descriptions of *Apatela* larvæ. When these are all known we shall know where to arrange such forms as *Innotata*, *Connecta*, *Radcliffei*, and under what "sections." I have carefully indicated the types of these "sections" from the names now in use in literature according to priority. Those established by me have the types all indicated. At present I am strongly inclined to believe that Eulonche (*Oblinita*, *Lanceolaria*) has more than a sectional or sub-genera value. I have worked very thoroughly on the generic synonymy, and the student should study my Catalogue of the Noctuidæ in the Bull, Buffalo S. N. S. for 1874, where the typical species of each genus is given. I have, without assistance, performed a good deal of labor with nearly 1600 species of the N. Am. Noctuidæ. From what I expect, based on what I have seen, we shall finally have to arrange about 2000 kinds of Noctuidæ. In doing this, the preliminary work I have accomplished is useful from the care I have taken to use the right generic name, and I think uniformity may be properly secured by adopting my new Check List as the basis in this respect (for instance, in using *Apatela*, *Glaea*, *Lithophane*), since I have yielded every debatable point as against the undiagnosed genera erected by Hubner. There seems to me solid grounds for those I retain, and, at any rate, my reasons are all given for what I have done. I am not able to proceed in the publication of my general Monograph of the *Noctuidæ* for want of proper assistance and a salaried position where I can continue its preparation.

The conclusions, with regard to classification, to which I have arrived are, first, that all forms separable on color or modification of a pattern of marking are, in fact, related. Whether the intermediate forms have dropped out, or are yet produced by any of the principal forms, is a matter which experience must show and which decides as to whether we call them "species" or not. While, in descriptive work, occasional errors are inseparable from the conditions under which it is performed, the synonyms from this cause are in reality not many in the moths, so far as I have found. Secondly, that generic characters must be, in principle, dealt with in the same way as specific ones, the limits of the genera depending on the want of intermediate forms, the important point being that the combination of characters which constitute the genus, shall be readily seizable by the student.

ON SOME NEW SPECIES OF ARCTIA, AND SUNDRY VARIATIONS.

BY B. NEUMOEGEN.

ARCTIA EXCELSA, n. sp.

Head whitish-yellow; orbits of eyes black. Antennæ black, moderate and bi-serrate. Thorax whitish-yellow, with two prothoracic black dots, and three large thoracic black stripes. Palpi blackish, hairy, bright-red above, with a broad black dorsal line and two black lateral lines, segmentarily serrated; beneath black, with yellowish lateral, segmentary maculations.

Primaries black, inner margin partly narrowly edged with a whitish-yellow line. Fringes yellowish; markings cream yellow, as follows: A broad horizontal line between median and submedian nervures, starting from base and ending some distance from exterior margin, crossing about three-quarters of the wing in a straight line. Two transverse bands, divergent on the costa, but nearing each other, nearly uniting and resting on the horizontal line. Attached to the middle of anterior transverse band, and covering space between the latter and exterior margin, an irregular, triangular blotch, the broadest part of which is facing the exterior margin. Secondaries black, with yellowish fringes intermixed with black. A large, bright-red discal spot of irregular shape. Beneath the markings are the same, only that the color is not so intensely black as above. Expanse of wings, 36 mill. Length of body, 11 mill. This is a most beautiful insect, following closely *A. Celia*, Saund., and being intermediate between the latter and *A. Snowi*, Gr.

Habitat, North Carolina. Types coll. B.Neumoegen.

ARCTIA INCORRUPTA, *Hy. Edw.*, ♀.

The ♀ differs greatly in its aspect from the ♂. The black color is more intense in the primaries and in the dorsal and segmentary stripes of abdomen. The transverse and horizontal bars on primaries are generally narrower and of a brighter yellow. The secondaries are of a deep red, fading somewhat towards base. The black marginal triangular-shaped blotches on secondaries are prominent and well-marked.

On a superficial glance this insect could be taken for *A. phyllira*, Dru. ♀, especially of the Southern types from Florida, but on closer examination bears out all the characteristics of *A. incorrupta*, ♂.

Types coll. B. Neumoegen.

ARCTIA INCORRUPTA, var. OCHRACEA. *Neum.*

A splendid variety of this handsome insect. Abdomen light yellow with black dorsal and lateral segmentary stripes. The markings on primaries of straw yellow; the secondaries of prominent bright ochre color. Otherwise agreeing with the typical form.

Prescott, Arizona. Type coll. B. Neumoegen.

TELEA POLYPHEMUS, var. OCULEA. *Neum.*

Primaries and secondaries are of a very light tan color. The ocellus on primaries is surrounded by a crescent of blue on inner side, and encircled by a prominent black ring. The ocellus on secondaries has a larger cloud of blue than in the typical form, being enclosed by a very broad, black, cloudy ring, which gradually shapes off into a black, broad transverse band towards inner margin.

This is a very handsome variety, occurring in New Mexico and Arizona, is larger than the Eastern types, and can be easily distinguished by the blue ringed ocellus on primaries.

Types coll. Prof. Snow and B. Neumoegen.

DESCRIPTIONS OF NEW SPECIES OF HESPERIANS FOUND IN THE UNITED STATES.

BY W. H. EDWARDS.

PAMPHILA BRETTOIDES.

♂. Size of Brettus.

Upper side of primaries bright yellow fulvous; discal mark on stigma, as in *Brettus*, flat, dull-black, pointed at outer end, bent a little in middle, broad in middle, and nearly even width to basal end, where it narrows and ends roundly; behind it a broad patch of black, and before it, black scales, most dense at the two ends; there is no fuscous patch between stigma and apex of wing; the hind margin also very narrowly edged with fuscous, without enlargement at apex (whereas in *Brettus* there is a large area of fuscous at apex and the margin is broadly-bordered with same color, with projections into the interspaces); on the inner edge of the apical area are two small fuscous marks in the sub-costal interspaces.

Secondaries yellow-fulvous on middle of disk, the costal margin fuscous, hind margin narrowly edged, fuscous. the inner margin obscured up to second branch of median; fringes yellow-fulvous.

Under side bright yellow-ochre; primaries have the base and inner margin black nearly to inner angle, immaculate, except that the two sub-apical spots appear faintly. Secondaries have a row of small pale fuscous patches beyond disk, two of which lie in lower sub-costal and upper discoidal interspaces, and two in the two median interspaces; these patches are much covered by fulvous scales; on middle of disk three small, similar patches, in which the black is more decided, the lower one (and largest) being at origin of lower median interspace, one at upper corner of cell, another above this.

Body above dull fulvous, below yellow, with a gray tint; legs color of wings; palpi whitish-yellow; antennæ fuscous above, pale fulvous below; club ferruginous above, tip same.

From 1 ♂ sent me by the late Jacob Doll, taken in West Texas, and 1 ♂ in collection of Mr. Neumoegen, taken by Mr. Morrison at Graham Mountains, Arizona.

AMBLYSCIRTES CASSUS.

Male. Expands one inch.

Upper side of primaries brown, dusted with fulvous, most densely on inner margin to cell, giving that part of the wing a fulvous hue rather than brown; from costa, at about four-fifths the distance from base, are three small light fulvous spots in straight line, and across disk an oblique row of fulvous spots, the upper one a little nearer hind margin than the lower of the costal spots and very near it; these spots are small at outer end of the row, but on the median interspaces are diffused; near end of cell a fulvous crossbar, which connects with a stripe of same color, running towards base next stigma; stigma short, confined to the second median interspace, narrow, a little bent down at outer end. Secondaries have the costal margins fuscous, the rest dull fulvous, with no spots; fringes dull white, or yellow-white, fuscous at the ends of the nervules, and along upper half of primaries; just at apex purer white.

Under side of primaries fulvous next base and over disk to costa, black on inner margin to base; the apex gray-brown, caused by whitish scales on brown ground; the spots repeated, those on costal margin white. Secondaries dark brown, dusted with whitish scales, along inner margin up to submedian nervure dull fulvous; a straight row of not well defined whitish spots beyond the disk, and at right angles to this two small similar spots at outer angle and on costal margin, this last in line with one or two indistinct whitish spots on middle of the wing; another spot nearer base just over cell; all these spots are obscure, as they are of the same hue as the dusting of the wing.

Female—Expands 1½ inches.

Upper side rather less bright, the spots yellow-white; beneath, the fulvous on anterior part of primaries is dull, and does not reach costal margin, which is dark, or blackish-brown, dusted with gray; the whole of inner margin to cell and to hind margin is blackish-brown; apex same, lightly dusted with gray; the spots white next costa, the rest yellowish and well defined. Secondaries as in the male, but the ground is blacker, and the whitish patches more distinct, forming a row bent at right-angles at outer angle of the wing; the inner patches form a similar bent line.

From 3 ♂ and 1 ♀ in my collection and that of Mr. Neumoegen, all taken at Mt. Graham, Arizona. The species is allied to *Nanno* and *Aenus.*

NOTES ON NEW SPECIES IN MR. NEUMOEGEN'S COLLECTION.

A. R. GROTE.

NONAGRIA PERMAGNA. n. s.

♀. A very large form, the largest known to me, and with the proportions of a small *Sphinx*, the resemblance heightened by the long abdomen, with the curious genitalia exposed beneath. Differs from all Guenee's descriptions in this genus and darker in tint than my *Oblonga.* The entire insect is of an obscure reddish-ochrey, concolorous. The markings are extremely few. On fore wings merely four to five black points of the transverse posterior line are visible towards the centre of the wing, and there is a terminal series of minute black points. There is a very sparse sprinkling of dark scales on terminal field, costal region and along sub-median interspace, only visible under a lens. Hind wings a little more reddish centrally. Beneath small discal spots and a common extra mesial shade-band, broadest on fore wings, which are clouded sub-terminally with fuscous. Indian River, Florida. *Expanse* 98 mil. *Length of body* 34 mil.

YPSIA ÆRUGINOSA. Guen.

I regard this as simply a fresh *Undularis*, just as *Carissima* is a pseudo variety, all fresh *Cara*, having a powdering of green scales, as indeed, has Guenée's type, and all *Hemaris Fumosa* of Strecher are fresh *Hemaris Tenuis* of Grote, with the fine scales adherent on the glassy fields which are to fall with the first quiver of the wings.

TÆNIOCAMPA PERFORATA, n. s.

♂ ♀. Of a peculiar greyish-fuscous or stone color, and allied to the Californian *Rufula.* The sub-terminal line is accented by three or four preceding black points opposite the cell; the median space darker than rest of wing, the median lines and stigmata illegible; the reniform stained and blackish; claviform outlined. Lines marked by double costal streaks, with paler enclosed shades. T. p. followed by minute points; fringe a little darker. This may be a color variety of the Californian species, as I have seen some Californian specimens varying In this direction, but I prefer to register it as distinct for the present, not being willing that what may be different species should be labeled *Rufula*. *Perforata* is concolorous, grey-fuscous, smooth. Hind wings pale at base, with pale fringes and soiled veins. Beneath paler grey, irrorate, with dark denticulate common line; suffused discal shade on fore wings and blackish discal point on hind wings. Arizona. *Expanse* 29 to 30 mil.

CARADRINA CIVICA, n. s.

♂. This species I have known for a long time, and in vain searched for a description to fit it. A name for it may be found in B. Mus. (where it is, I think, unnamed in my coll.), but I have not noticed it. Allied to *Multifaria*, but of an ochrey and paler gray. The black costal dots evident at inception of the single faint uneven transverse lines and median shade. Subterminal line preceded by a rufous shade from below costal region. Terminal space dark. Hind wings translucent white, with narrow smoky edge, and extremities of veins soiled beneath, with costa ochrey gray terminal dots and a discal dot. Fore wings beneath ochrey gray; a discal fuscous shade and lunate mark; an extra mesial band; terminal field fuscous-shaded. Head and thorax ochrey gray; abdomen pale. *Expanse*, 30 mil. Colorado (Snow. green label, 34).

LITHOPHANE PEXATA. var. WASHINGTONIA.

Resembles the European *Ingrica* still more than the Eastern *Pexata*, but may be a distinct species from either. Thorax and abdominal tufts black. The former with white lateral patches. Fore wings black, with a yellow basal streak surmounting a longer and finer longitudinal velvety-black hair-streak. Lines faint, double. Reniform very large, stained with brown; orbicular, with a slight pale edging to its circlet. Sub-terminal line rusty-black, relieved by a paler ground; a pale yellow mark above anal angle. Hind wings fuscous, with pale fringes. Beneath with a diffuse extra-mesial band and discal mark, the ground paler, stained with brown; forewings darker. Abdominal tufts at ex tremity brownish. *Expanse* 42 mil. Washington Territory.

ORTHOSIA CITIMA. n. s.

Near to *Conradi*; fuscous-ochrey. Reniform constricted, long, sub-lunate, with powdery-white scales lining the ring and dark centred; claviform small; orbicular oblique, moderate, dark-centred, with powdery-white annulus. Middle of the wing ochrey; terminal field dark. Median shade oblique, apparent below;

reniform brownish. Sub-terminal line marked with white joints on the veins. Thorax dark-brownish; Head brighter colored. Abdomen pale fuscous-ochrey. Hind wings dark fuscous, with pale dirty-ochrey fringes. Beneath brighter and paler ochrey, with black discal dot on secondaries and a fuscous extra-mesial line, flexed before anal angle; fore wings darker, with clouded discal lunule and extra-mesial line- A large Hadeniform species with untufted abdomen and naked eyes. Arizona. *Expanse* 41 mil.

CUCULLIA CITA. n. s.

Allied to *Laetifica*. Very pale whitish-gray. Disk of thorax blackish. On fore wings the brown-black anal streak commences below vein 2, and runs invariably and somewhat obliquely to submedian fold, along which it is more finely prolonged, entering the sulcation of the transverse posterior line, which is here legible and preceded by a faint white cloud. Short dark marks surmount the anal streak on the two superior interspaces on margin. Terminally there are white and fine dentations, enclosing the darkly marked veins. A very fine basal streak joining the deeply dentate and illegibly marked inner median line. Reniform hardly indicated. Hind wings translucent white with soiled veins and smoky edging; fringes white. Collar with a fine mesial line. Abdomen whitish-gray with dark tufts. Beneath hind wings white, fore wings gray. Arizona. *Expanse* 43 *mil.*

PHURYS OVALIS. n. s.

Median lines yellow, ridged, edged outwardly with brown. The ground color is a dusky ochery gray, as compared with *Vinculum*. Reniform a narrow dark lunule. Veins tending to be darker marked. A series of pale yellowish streaks on the veins connect the outer line with the dentated subterminal line, which is brown, toothed inwardly, the points formed in the veins and again connected by interspaceal streaks with the dark terminal edge of the wing. Thus a series of oval-enclosed spots are formed terminally, which is distinctive of the species, and very neatly marked and curious. Hind wings darker outside of the mesial line, which is lost at costa; a reflection of the curious terminal markings of primaries is visible. Beneath very strikingly colored, being bright ochery, immaculate, with dark leaden-hued fringes. *Expanse* 33 *mil.* Arizona. One fresh female example.

PSEUDORGYIA RUSSULA. n. s.

♂. Antennæ plumose; no ocelli; labial palpi prominent, much exceeding the front, with long apical joint; vestiture hair-like scales; legs slender, unarmed; front smooth; vein 5 nearer 4 than 6. The moth has a geometridous look, contradicted by the neuration and the noctuidous palpi and a distant resemblance to some pale or faded Nemeophilæ. From *Versuta* (the type of which I have examined) it differs in color. Pale, faded ochrey; the primaries with a slight reddish tinge and no marks except the fragments of a diffuse median fascia. Secondaries darker, somewhat fuscous, with dot. Beneath concolorous pale warm ochrey; the secondaries with discal point. A most singular insect. From memory of the Texan example I refer it to Dr. Harvey's genus. It may be that other examples will show more markings, as my type is not very fresh, though perfect. *Expanse*, 30 mil. Arizona. Coll. Neumoegen.

CARADRINA FRAGOSA. n. s.

Slender bodied, in color paler, more brown than *Miranda;* the forewings are of a powdery pale ochrey-brown mingled with fuscous, becoming completely fuscous terminally. There are three dark vague costal marks, indicating the lines and median shade; t. p. line single, fragmentary, denticulate: t. a. line a vague shade. Orbicular and reniform minute with central white scales. Hind wings pale smoky, with pale fringes. Beneath pale smoky, without markings. Front pale; second joint of palpi dark at the side. Antennæ simple; eyes naked.

TÆNIOCAMPA VIRGULA. n. s.

This species is allied to *Agrotiformis*, with a slender body and untufted abdomen. It may be known by a black streak crossing subterminal field opposite the cell beyond the small pale reniform. General color of various shades of brown. Stigmata small; orbicular with central point, concolorous; reniform paler than the wing. No claviform. Lines single, fragmentary, blackish; s. t. line dark, upright; the terminal field following it is paler than rest of wing; s. t. line preceded by dark marks, opposite all of which one (above noted) forms a streak. Hindwings fuscous, with pale ochrey fringes; beneath paler, with line and discal dot. Head and thorax reddish brown, like primaries. Fore wings, above the veins, on subterminal field, are marked with blackish; the t. a. line is accented by following dark dots, dentate, and looks double; t. p. line waved. Antennæ simple. *Expanse*, 25 mil. Arizona.

AGROTIS TEXANA. Grote, Proc. Ent. Soc. PHIL., Vol. II., Pl. VI., Fig. 2, (1863.)

A female specimen of this species is contained in Mr. Neumoegen's collection from Arizona. It expands 38 mil., and is less distinctly marked than my figure, but the example is not quite fresh. It seems to me a good species, allied to the common *Ypsilon* and *Saucia*, but of a much lighter ochery fuscous color. It is strange that I have seen so few specimens of this species since I described and figured it twenty years ago.

TRICHOPOLIA. n. g.

Eyes hairy, lashed; tibiæ unarmed. Male antennæ simple, or finely bipectinate tapering to tips. Abdomen exceeding hind wings, with reduced basal tuft Thorax hairy without defined tufts. Form like *Heterocampa*. Hind wings white or whitish in both sexes without sub-apical sulcation. Wings entire, straight along costa; apices determinate; outer margin a little rounded and rather short, the inner margin being sub-parallel with costal and in *T. Dentatella* with a rounded, basal enlargement. The insects have a resemblance to some *Heterocampæ* (*Celtiphaga.*)

TRICHOPOLIA DENTATELLA. n. s.

♂. Very dark grayish fuscous with a greenish or olive cast. Markings illegible; the three stigmata indistinct; moderate, subequal, outlined in black. Terminal space with interrupted dashes. Hind wings white, with terminal dotted line. Antennæ bipectinate. Thorax like fore wings, with a greenish cast, indistinctly marked. Arizona.

TRICHOPOLIA PTILODONTA. n. s.

♂ ♀. Entirely dark grayish fuscous; male antennæ simple. No greenish or olive cast whatever. The stigmata are concolorous, outlined in black, reniform large; claviform wide; orbicular with a central dot. Lines indistinct. Hind wings white; soiled in female, with dotted mesial line; beneath with discal point. Thorax like primaries. Two females; one male. Arizona. J. Doll.

This looks like *Dentatella*, but differs by the want of any olive tinge, the simple antennæ of the male and the larger, better defined stigmata. Both, but especially *Dentatella*, look like small Notodontidæ. The hairy, lashed eyes, the Notodontiform abdomen, the general shape of the wings, seem to unite the two species, although the male antennæ are very different. Before examining the frenulum I took the three specimens of *Ptilodonta* for females of *Dentatella*. If, as the plainly single frenulum of one *Ptilodonta* assures me, I have made no mistake; it is yet possible that a different genus must be used for the second species.

LITHOPHANE GAUSAPATA, n. s.

Allied to *Petulca*. Entirely of a dull purple red, the primaries showing a gray bloom. Fore wings with the two mesial lines brown, sub-parallel, outwardly oblique from costa, more or less fragmentary and indistinct. Reniform a rusty yellow stain. Claviform indicated in pale, with a small brown following mark. Hind wings and abdomen dull red; beneath a brown discal dot on secondaries. Frontal tuft a little darker beneath. Soda Springs in October (Behrens). One bred specimen, the wings on the left side a little unexpanded. The markings are simple and the species readily detached; it is much darker and more richly colored than its eastern allies *petulca*, *ferrealis*, etc.

AGROTIS PERFUSCA, n. s.

All the tibiæ spmore; allind to *Cochranii* (*messoria* Harris teste Riley), but uniformly dark fuscous leaving all markings illegible. Smaller than *Pastoralis*. Stigmata concolorous, moderate; orbicular round; reniform wide; both marked by whitish scales and similar scales dispersed along s. m. fold. Hind wings fuscous. Abdomen flattened. Beneath paler; hind wings with two shade bands and discal mark. *Expanse*, 34 mil. One female. Soda Springs, Cal.

CEA. n. g.

Allied in form, texture and vestitute to *Trichocosmia*. Eyes naked, unlashed. Vestiture narrow—scaly. Form slight, weak, tegument pale. Antennæ simple. Colors pale, a little silky. Front wide, rising to an embossed protuberance, around which the short clypeal vestiture circles; infra-clypeal plate distinct. Ocelli. Labial palpi slender, rather weak, with elongate third joint. Vestiture not strongly adherent and not hairy. White, immaculate; fore wings very pale yellow. Tibiæ unarmed. Legs weak, not hairy. Abdomen very little exceeding hind wings, with dorsal carina. Body untufted. Wings entire, rather broad and short; apices determinate, and outwardly the primaries are full.

CEA IMMACULA. n. s.

Form of *Calymnia*. Thorax and primaries very pale yellow, almost white, immaculate. Hind wings pure silky white above and below, without marks. Body white. Arizona. *Expanse*, 27 mil.

AGROTIS APPOSITA, Grote.

Fresh specimens from Soda Springs show that the body has a purply tinge beneath reminding one of *Lithophane*. It belongs to the group with unarmed fore tibiæ. It may be known by its purple-black wings shaded centrally with rusty-red and pale about the median lines and with obsolete stigmata. Hind wings blackish fuscous. *Expanse*, 36 mil.

PYROPHILA TRIQUETRA. n. s.

Tibiæ unarmed, vestiture mingled scales and hair; eyes naked, behind with very short lashes. Body smooth, somewhat flattened. Labial palpi with small conical third article rather short. Form of *Orthodes*, but distinguishable by the naked eyes. Probably not to remain here, but sharing some of the structural features of this genus. Dark fuscous; the fore wings have three unequal black marks, one above the other, preceding the subterminal line superiorly; the middle very small, the lowest the largest. Lines and stigmata concolorous, marked with pale. Hind wings and body paler fuscous. Beneath wings fuscous, paler at base, with indications of exterior dark line and without discal points. Body beneath yellowish. Palpi dark on the side of second joint. Arizona. *Expanse*, 28 mil. The black marks before s. t, line are vivid, and alone break the monotony of the wings, which are of the dirty fuscous color of *Agrotis Cochranii*, *H. Devastatrix* and other ugly Noctuidæ. It is a flattened, shiny species, looking as if it lurked under bark, where I have found *Pyrophila* and *Agrotis Clandestina* in abundance. This latter, with *Cupida*, etc., should form a subgenus of *Agrotis*.

MECOCERAS PENINSULARIA. n. s.

♂. Possibly only a modification of *Nictocris*. Dull green, with the costa at base showing a reddish shade and dotted with metallic points. A black discal dot. A median, faint, reddish shade. An outer line of dark dots, An inner dotted line hardly perceptible. Wing with sparsely scattered black scales. Hind wings with the reddish median shade, including two white cellular spots; an outer reddish line marked with dark dots; another faint line before the margin and a line of black dots on margin edged within with pale. Abdomen with four dorsal black dots at wide intervals. I find no note of this in Gueneé. Palpi ensiform or curved, with small terminal joint. Antennæ finely bipectinate. Wings entire. Feet long and narrow. Front and palpi reddish. Beneath reflecting the markings, pale; the dotted dentate line on secondaries running at variance with median shade. Indian River. *Expanse*, 40 mil.

ALMODES RIVULARIA. n. s.

♂. Possibly a modification of the Haytien *Terraria*, but quite different from Gueneé's description. Of an olive brownish, somewhat pallid; the median lines principally marked on costa by broad. dark shades on fore wings above. A median line continuous. A black discal mark and scattered elevated black scale points. Hind wings dentate, concolorous; the discal raised point black and white. Beneath costa dotted with black, with a *distinct reddish flush*; discal points black. Palpi tipped with dark. Antennæ finely and lengthily plumose. The wings above are crossed by interrupted, faint, dark lines, like a *Boarmia;* the hind wings best marked. The veins are indicated on fore wings, where the outer line is dotted. On hind wings there is a marginal black line edged within with whitish. The ground color is more brown than "testaceous;" there is a sprinkling of black scales. The color is of a cadaverous olive brown, and the insect looks quite unlike *Mecoceras*, until palpi and antennæ are compared. *Mecoceras*, *Almodes* and *Byssodes*, all occurring in Florida, give our fauna a tropical representation not before suspected. Packard mentions none of these nor *Urapteryx*. *Expanse*, 40 mil.

Properly speaking, we should not include the fauna of South Florida in our North American Lists. It must be studied in connection with that of Cuba, Hayti and Jamaica. There is a species of *Nelphe* very like *Confinis* H.-S., from Cuba. We have the following, which are either modifications of Cuban forms, or, perhaps, not even sufficiently distinct to bear a different generic or specific name. In some cases the forms are apparently distinct.

FLORIDA.	CUBA.
Didasys Belæ, *Gr.*	Burtia Rubella, *Gr.*
Lymire Edwardsii, *Gr.*	Lymire melanocephala, *Walk.*
Cautethia Grotei, *Hy, Edw.*	Cautethia Grotei, *Hy, Edw.* = *Noctuiformis*, H.-S, non Walk.

Eupendosoma Floridum, *Gr.*	Eupseudosoma niveum, *Gr.*
Nelphe sp.	Nelphe Confinis H.-S.
Euhalisidota longa, *Gr.*	Euhalisidota fasciata, *Gr.*
Byssodes Obrussata, *Gr.*	Byssodes Argentata, *Dr.*
Mecoceras Peninsularia, *Gr.*	Mecoceras Nitocris, *Cram.*
Urapteryx Floridata, *Gr.*	Urapteryx Palitia, *Cram.*
Almodes Rivularia, *Gr.*	Almodes Terraria, *Guen.*

It is difficult to separate the Brazilian and Guiana species from certain Florida insects. As a rule, the East Coast species are not the same as the South Texan and Mexican. And we shall have to examine, finally, the whole American intertropical fauna, to get a proper notion as to distribution. With regard to the Florida fauna, the species must be named separately if there exists any ground for believing them distinct, although we shall have to wait for large collections to finally decide as to their specific standing.

FLOWERS ATTRACTING INSECTS.

By Mrs. C. H. Fernald, Orono, Me.

Most people love flowers and cultivate them for their beauty and fragrance, but to collectors of insects some of them have a double charm, for they attract some of the most beautiful and rare Lepidoptera.

It has been suggested to me to mention some of the plants to which certain insects are attracted in this locality. The common lilac (*Syringa vulgaris*) and the Tartarian and Siberian honeysuckles, when in full bloom, during the hottest hours of a bright, sunny day, are a perfect paradise for several of the Lepidoptera, as well as numerous Hymenoptera and Diptera. The gaudy *Papilio Turnus* sails proudly over the highly-scented flowers, frequently dropping down to sip the nectar; and *Hemaris Diffinis* and *Thysbe*, with an occasional *Gracilis*, whiz about among the flowers as "busy as the bees." Then at twilight the larger Sphinx moths, *Gordius* and *Chamænerii*,, and rarely *Luscitiosa*, dart swiftly from shrub to shrub, and from flower to flower, requiring a quick eye and hand to capture them. *Heliophila Albilinea*, *Plusia Simplex* and *Precationis*, and occasionally a *Bimaculata*, are also taken on these flowers. Rarely the beautiful and choice *Lepisesia Flavofasciata* is found on the lilac, but always in a worn condition; better specimens are taken earlier on apple-blossoms, and the best one ever captured in this place was found still earlier on *Amelanchier Canadensis* in the woods. I have captured more insects on *Oenothera Lamarckiana* than on any other plant. A plot about three feet square gives from fifty to one hundred fresh flowers about four inches in diameter every evening, and if the seed pods are picked off they can be kept in bloom for three months.

The most common insect upon this plant is *Sphinx Chersis*, then *Drupiferarum*, *Kalmiæ*. *Undulosa*, *Hylæus*, *Harrisii*, and, later, *Lineata;* and of the Noctuids, several species of *Heliophila* are common, *Nephelodes violans*, *Apamea Nictitans*, *Drasteria Erechtea*, *Plusia Mortuorum*, *Ampla*, *Putnami*, and also those which frequent the lilac. It is the home of the beautiful *Rhodophora Florida*, which are found in the morning. tucked away, head downward, in the half-closed flowers, the yellow tips of their wings just showing among the stamens. They look so cosy, it seems almost cruel to shake them out into the cyanide bottle, but in this way many perfect specimens may be obtained. They breed so freely upon this plant that it is difficult to preserve the buds entire, as the larvæ eat round holes into them, in which they nearly bury themselves, When the buds are all gone they will feed upon the decaying flowers and the seed pods, boring into them in the same manner. The stalks of this plant also contain a Tineid larva, *Laverna ? Eloisella*, Clem. Several Geometers are also attracted to the Oenothera, and I have bred *Glaucopteryx Cumatilis* from it. The rare *Plusia Striatella* and *Putnami*, and all the more common Plusias, are found hovering over the single white Petunia. The climbing honeysuckle attracts *Plusia Balluca* and *Bimaculata*, as well as the common species, and also many of the same Sphinx moths as the Oenothera. I have taken several of the before-mentioned Noctuids also on Perennial Phlox and Annual Larkspur, and doubtless should find more on these plants were it not for the much more fragrant Oenothera and Petunias close by. Possibly other species might be captured at the flowers, but as I sugar for moths on the garden fence, many may prefer the sugar to the flowers. Mr. L. W. Goodell, of Amherst, Mass., kindly informs me that *Datura Wrightii*, *Nicotiana affinis*, *Sweet Alyssum*, *Sweet Mignonette*, *Sweet William*, *Verbena Montana*, *Mirabilis longiflora*, and the old *Clove Pink*, are also more or less attractive to insects.

A NEW NOTHRIS FROM ILLINOIS.

BY D. W. COQUILLETT.

NOTHRIS TRINOTELLA. n. sp.

Reddish-brown, with three white dots near the center of each fore wing, the outermost dot crossed by a black dash; expands 11 m. m. Head pinkish-brown; basal joint of palpi dark brown outside, whitish inside, upper side of terminal tuft pale pinkish; terminal joint dark brown; antennæ pale yellowish ringed with dark brown, the basal joint wholly dark brown, Thorax reddish-brown. Primaries reddish-brown, inclining to pink, and sparsely dotted with black; near the center of each are three white dots arranged somewhat in the form of a right-angled triangle, its base next the base of the wing, the upright next the costa; the two dots forming the base of the triangle have a dark spot on that side of them which is nearest the body, and the third dot is crossed transversely with the wing by a black dash; fringes slightly paler than the ground color. Secondaries dull leaden, unmarked; fringes dusky, becoming lighter next the body. Under side of primaries deep brown, the costal and apical margins marked with pale yellow. Under side of secondaries dull leaden, marked along the costa and at the apex with light yellow and brown. Abdomen brown, marked with pale yellow, which on the ventral surface forms two lines; legs brown, the points marked with pale yellow.

Described from a female bred from a larva found in a folded leaf of Hazel. It was sent to Lord Walsingham, who returned it labelled " Nothris sp.;" I sent a brief description and a sketch to Mr. V. T. Chambers, who replied that he was unacquainted with it and believed it to be a new species.

THE PINE MOTH OF NANTUCKET.

A REVIEW BY A. R. GROTE.

Mr. S. H. Scudder has just published a pamphlet with the above title, containing a colored lithographic plate illustrating the subject of the treatise. The pamphlet is one of the publications of the Massachusetts Society for the Promotion of Agriculture, and contains 22 pages of large print, including an appendix extracted from Professor Comstock's Government Report bearing on the subject. The moth *Retinia Frustrana*, Scudd., which injures the pine (*P. Rigida*) trees in Nantucket, is a new species with European allies, and the description of its ravages, the facts of its history, and its appearance in three stages are elaborately described and scientifically treated by the author. The remedy, to break off the affected buds in June and burn them, is feasible from the limited extent of the plantations and their insular position. It is clear that in this case the moth *can* be exterminated; the question is one of cost and labor, and whether it is worth while. If the moth really only occurs on Nantucket, we should be sorry to destroy the pretty species. This does not seem likely, however, and if the species threatens to destroy the pines, there is no question but that it would be better to destroy the moth and act upon Mr. Scudder's very sensible suggestions. The pamphlet is remarkable for the clear statements, the absence of bombast, and the thorough comprehension of the subject displayed by the author.

OBITUARY.

G. W. BELFRAGE.

To the grief of the entomological world, this excellent collector and amiable man was stricken by death on December last at his home, Clifton, Bosque Co., Texas. The materials for a biographical sketch of Mr. Belfrage's life are but scanty, but from an intimate friend of his for many years the following brief memoranda have been obtained. He was born in Stockholm, Sweden, and at the time of his death was about 50 years of age. He was descended from an old family of the Swedish nobility, and began life as a soldier, but the military profession was distasteful to him, and his early acquired love for natural history caused him to resign his commission and to emigrate to the United States. He first resided in Charleston, S. C., then for a brief period in New York City, and afterwards, for about two years, in Chicago. In all these places he formed large collections, chiefly in Entomology, and in 1867 he made his home in Texas, his explorations in that little known State being productive of most valuable results. He traversed a large portion of the State, and the many new species discovered by him bear ample testimony to his energy and power of observation. His correspondence, both in this country and Europe, was very extensive, and it is to be regretted that that he did not leave behind him some permanent records of his knowledge of his favorite science. His health never very strong, broke down under the fatigue and exposure to which he had subjected himself, and after an acute illness of several weeks' duration, he closed his eyes upon the world on the 7th of December, 1882. Mr. O. Solberg, who has kindly communicated these few facts with reference to Mr. Belfrage, says of him: "When he left us, he left no enemies, but many friends, all of whom will greatly miss him, and always cherish his memory." It is probable that his collections will be forwarded to Stockholm." H. E.

NOTES ON LEPIDOPTERA.

ON TWO CLOSELY ALLIED TARACHE LARVÆ—TARACHE ERASTROIDES, Guen. The description of this larva which I gave on page 8, Vol. I., of "PAPILIO," also includes the larva of *T. candefacta*, Hubner. The chief differences in these two larvæ are to be found in the markings of the head; in *erastroides* the head is green, mottled with black, brown and whitish; while in *candefacta* it is striped vertically with alternate whitish and green lines, the latter sometimes tinged with purple. The food plant of the two species is the same—*Ambrosia artemisiæfolia*. Two larvæ of *erastroides* pupated about July 24th, and the imagos issued August 5th and 6th. A larva of *candefacta* pupated in the latter part of July and the imago issued on the 10th of the following month. I have also found the larvæ of *candefacta* in the vicinity of Anaheim, California (my present home); they do not differ from Eastern specimens, and tha food plant is the same. One specimen pupated August 22, and the imago issued September 5; the latter is considerably darker than any of my Illinois examples. D. W. COQUILLETT.

APPENDAGES OF LEUCARCTIA ACREA. In response to Mr. Stretchs' interesting paper on the appendages of *L. Acræa.* I would state that so far as known to me, they were first observed by the late Mr. C. T. Robinson, who showed me a preparation of them at his residence in Putnam County, N. Y. I believe, also, Mr. Morrison very fully published them in Psyche; I have not his paper to refer to. Mr. Robinson made notes on this discovery, but they were not published; I have alluded to their existence in Ann, N. Y., Lyc. Nat. History. A. R. GROTE.

In the February number of "PAPILIO" Mr. R. H. Stretch asks if any Eastern entomologists have found the peculiar abdominal organs of *Leucarctia acræa*, Smith, which he describes. While dissecting a male moth of this species in July last, I saw these organs. I afterwards examined many other specimens, and always found them present. I also examined allied species, and found them in *Pyrrharctia Isabella*, Smith. As I could find no mention of them in any accessible works on entomology. Prof. A. J. Cook kindly took some specimens to the Montreal meeting of the A. A. A. S. He showed them to Prof. C. H. Fernald, who pronounced them to be scent organs. The hairs on the membranes of the appendages in *P. Isabella* are white. They may be seen in dried specimens by dissecting away the upper posterior portion of the abdomen.

CLARENCE M. WEED, Lansing, Mich., April 9, 1883.

EARLY APPEARANCE OF HYPHANTRIA CUNEA, Drury. Two specimens of this moth have been taken here this Spring, one on March 19 and the other on April 14. The first was found in the house on a window, while the second was captured out of doors: I think it an interesting and not generally known fact that this insect is to be found so early in the season.

WM. T. DAVIS, Tompkinsville, Staten Island.

PAPILIO.

Organ of the New York Entomological Club.

Vol. III.] **May and June, 1883.** **[Nos. 5 and 6.**

NOTE.—Owing to the absence of the Editor from New York, it was impossible to produce the May number in proper time. It is hoped that the contents of this double number will compensate for the delay. (Issued July 10, 1883.)

ON THE POLYMORPHISM OF LYCÆNA PSEUDARGIOLUS. *BOIS.*

By W. H. Edwards.

This paper, nearly in its present form, was read at the Montreal meeting of the Am. Assn. in 1882. Some additions and alterations have been rendered necessary by the receipt of Mr. Morrison's collections of 1881, and by further information respectlng *L. Piasus*.

Coalburgh, W. Va., April 1, 1883.

L. *Pseudargiolus* received its specific name in 1833, but Abbot had figured it in 1797, Ins. Ga., as *Argiolus*, mistaking it for the European species of that name. In 1862, I described as *Neglecta* what has since been found to be a co-form with *Pseudargiolus*, in W. Va., and the usual northern type of the summer generation. I also described L. *Violacea*, from W. Va., in 1866. At that time, very little was known of the polymorphism of butterflies, seasonal or other, and, moreover, that was a phenomenon which was only discoverable by breeding from the egg, and nothing whatever was known of the preparatory stages ot any one of these supposed species.

Kirby had described L. *Lucia*, in Fauna Boreali Americana, in 1837, and, fortunately, had given a well executed and colored figure of it. His description does not agree with his figure, varying in several important particulars; but as he says that only one specimen was taken by the Expedition, I apprehend that the careful figure should be our guide, rather than the less careful description, especially as the figure really represents a common boreal form of the butterfly. The description says: "Wings above silvery-blue; the secondaries are *brown* underneath and *spotted with black and white; towards the posterior margin the white spots are arranged in a transverse band parallel with it*, and, as in the primaries, the *wing terminates in several obsolete eyelets.*" The synopsis of character which precedes the description differs from the latter, thus: "Secondaries underneath *brownish-ash color*, spotted with black and white." One says "brown," the other "brownish-ash color."

The colored figure shows the basal area of secondaries to be whitey-brown, and there is a conspicuous blackish, triangular patch on the disk at the origin of the median nervules, of which the text is silent; the extra discal area is scarcely whiter than the basal, and is not composed of white spots, as would be understood by the description. It is merely the uninterrupted white ground of that part of the wing. Also, the margins by no means represent obsolete eyelets, as stated, but heavy dark confluent crenations.

I believe the typical *Lucia*, as our collectors understand it, has a more or less conspicuous black discal patch, as indicated in Kirby's figure, and a heavy black border. As witness to this, Mr. Scudder, Can. Ent., VIII., 62, describes *Lucia* as having the spots of the under hind wing "very large, usually completely confluent, and often suffusing nearly the whole base of the wing; and the marginal markings tend to form a broad band, etc. This agrees well with the figure, whereas the description might pass for *Violacea* of a silver-blue shade, and on which the white scales of under side had been partially denuded, so as to disclose the brown sub-color, thereby leaving the white area somewhat macular. The fringes are white and black alternately.

The typical *Violacea* is violet-blue above, light grayish-white beneath, and all of one shade, there being nothing macular in it, with dark points across the disks, and pale dusky crenations in outline on the margins. But while, in W. Va., violet is a prevailing color, many are lavender-blue, or silvery, and some, especially females, are metallic blue. The range of color embraces all the shades which are to be found in the northern corresponding forms. The fringes are either white and black as in *Lucia*, or on the hind wing white altogether. At the extreme north, the under side of *Violacea* is not so white and pure as in the type, the brown sub-color appearing more or less. The southern *Violacea* considerably approaches *Neglecta* in color of both sides.

Now, in addition to the above-named and described forms, which stand at the extremes of the series, there is another midway between *Lucia* and *Violacea*, and distinctly characterized. The males are silvery-blue and as often violet-blue, the females almost always metallic blue, of the shade spoken of as sometimes seen in the Virginian *Violacea*. The fringes white and black, as in *Lucia*. The ground color of secondaries underneath is whitish, and continuous, and the marginal crenations are very heavy, confluent, black, making a conspicuous band. There is no discal patch, and therein it differs from *Lucia*; the marginal band separates it from *Violacea*. This form is as unknown in Virginia as is *Lucia*, but seems to prevail in New York, New England, and Quebec, at least in the region about Montreal. I call this *Marginata*. It has passed sometimes as *Lucia*, sometimes as *Violacea*, but by separating it we shall get a clearer idea of the species. Of course, these three forms, distinct as they are generally, all vary, and one approaches the other, or glides into the other, by intermediate examples, but I should say that forty-nine out of fifty individuals, no matter where found, would range under one of these names. They all belong to the same species. *Lucia* without the black patch is *Marginata*, and *Marginata*, without the black and heavy border, is *Violacea*. They are three phases of the winter form of the species, and whether we call them trimorphic forms, or three varieties, makes no difference in the result. At any rate the two extremes, *Lucia* and *Violacea*, differ materially.

In W. Va., *Violacea* is the sole representative of these forms, there being no examples so far known approaching *Lucia*, and very few indeed approaching *Marginata*, even by a slight deepening of color in the marginal band. And it has acquired a melanic male not before observed. Mr. Morrison took the same melanic male together with both *Violacea* and *Neglecta* in south Colorado.

In many seasons, the blue males swarm in my neighborhood, and assemblies of scores and hundreds may be met with along the water courses, early in April, or in the last days of March. The first generation vastly outnumbers its apparent second one, which is made up of *Pseudargiolus*, flying in May, and *Neglecta*, in June, and is now very abundant. Sometimes, with the early butterflies, a few individuals are taken which combine the features of both *Violacea* and *Pseudargiolus*, the males having the upper surface colored as in the latter, but the under marked like the other, and often more emphatically than in the type. I have such a mixed example from south Colorado also.

Precisely at what line *Lucia* and *Marginata* are suppressed, or where the melanic form comes in, I am not able to state. Dr. Jno. Hamilton, of Allegheny, and Rev. W. J. Holland, of Pittsburgh, both assure me that the black male has never been seen by them in Pennsylvania. To the west, Dr. H. S. Jewett, at Dayton, Ohio, has never seen the black male, though blue *Violacea* flies there. Mr. H. K. Morrison tells me that in western North Carolina both the black and blue forms are found. Mr. E. M. Aaron, now of Philadelphia, but formerly of eastern Tennessee, says that all the West Virginia forms of the species are found in Tennessee, North Carolina and Georgia. Abbot, in the Insects of Georgia, figured *Pseudargiolus* as *Argiolus* (of Europe) and its larva and chrysalis.

The typical *Pseugdariolus* is large, sometimes expanding 1.4 inch, and from that down to one inch. *Neglecta* expands from .8 to 1 inch. As a rule, the disk of forewing in *Pseudargiolus* ♀ is whiter than in *Neglecta*, and the under side of both sexes is purer white, with fewer and less distinct marks; and the disk of hind wings of *Neglecta* is pale, with a deep blue marginal border, while in *Pseudargiolus* both wings are of one hue. The northern summer form is *Neglecta;* in the south, *Pseudargiolus* flies in May and *Neglecta* in June, and, as I shall show, have not a direct relationship with each other notwithstanding the resemblance.

We have therefore *Pseudargiolus*, *Neglecta*, *Marginata*, *Violacea* and the melanic male (originally supposed to be the female) of the latter, all going to make one polymorphic species. I propose to show what is known of the inter-relationship of these forms.

1. In the high boreal regions both *Lucia* and *Violacea* fly.

I have *Violacea* from St. Michael's, Alaska; also from Anticosti. And *Lucia* from Anticosti and Lake Winnipeg. Kirby's *Lucia* was taken in lat 54°, or about as far north as the upper end of Winnipeg. Mr. Couper, who collected for two seasons on Anticosti, is confident that no butterfly can be double-brooded on that island, by reason of the short and cold summer. Probably at St. Michael's all species are monogoneutic also. As only two examples were received from this locality, both of which were *Violacea*, we cannot tell whether *Lucia* flies there or not. Very probably it does, and, if so, these two forms in Alaska as well as on Anticosti equally represent the species. Being single-brooded, they together stand for the parent species. They are the primary or winter generation. As the species has extended to the south, where a second generation was permitted, *Neglecta* is derived directly from it.

2. In a belt of latitude covering part of Canada and British America, and southward to Long Island at the east, and Racine, Wisconsin, at the west, we have *Lucia*, *Marginata*, *Violacea* and *Neglecta*. The three forms of the winter generation appear, in the territories they all inhabit, at the same period of the year. Neither precedes the other in time.

I give a table of localities of both the winter and summer generations, as they manifest themselves; also adding *Piasus* to bring the entire sub-group into one view.

Now as to the three members of the winter form appearing at the same time of the year. At my request, several gentlemen undertook very kindly to pay special attention to this point, the present year. Unfortunately, in most localities, this has been the most wretched conceivable season for butterflies, and Mr. Hulst is the only person who has met with the species we are considering in any numbers.

1. Dr. E. C. Howe, Yonkers, N. Y., says: "All these forms do really occur here, and at the same time."

2. Rev. George D. Hulst, of Brooklyn, N. Y., between 17 April and 19 May, took 118 ♂ 31 ♀. The first example was a ♂

TABLE OF LOCALITIES—WINTER AND SUMMER GENERATIONS.

LUCIA.	MARGINATA	VIOLACEA.	SAME. BLACK MALE.	VIOLACEA CINEREA.	NEGLECTA.	PSEUDARG.	PIASUS.
		St. Michaels					
Anticosti.		Anticosti.					
Winnipeg.		Winnipeg.					
Montreal.	Montreal.	Montreal.			Montreal.		
	London,Ont				London.		
Orono, Me.	Orono.	Orono.			Orono.		
Boston.		Boston.			Boston.		
Albany,N.Y		Albany.			Albany.		
Yonkers, "	Yonkers.	Yonkers.			Yonkers.		
L. Island.	L. Island.	L. Island.			L. Island.		
Racine,Wis.	Racine.	Racine.			Racine.	Racine.	
		C'lb'h,W.V.	Coalburgh.		Coalburgh.	Coalburgh.	
		Dayton, O.					
		Carb'ale.,Ill.					
		W. N. Car.	W. N. Car.		W. N. Car.	W. N. Car.	
		Georgia.	Georgia.		Georgia.	Georgia.	
		E. Tenn.	E. Tenn.		E. Tenn.	E. Tenn.	
	Montana.	Montana.				Montana.	
						Nevada.	
North Colo.					N. Colorado.		
		S. Colorado.	S. Colorado.		S. Colorado.		
				S. Arizona.		S. Arizona.	
						Arizona.	Arizona.
					S. California		California.
		Mt. H'd Or.					

Marginata 17th April; on the 19th, 1 ♂ same and 1 ♂ 1 ♀ *Volacea;* on 22d, 3 *Lucia*, two of which displayed very large patches on hind wings, 7 *Marginata*, and 4 *Violacea*; on 24th, 2 *Lucia*, 11 *Marginata*, 7 *Violacea*; on 1st May, 6 *Lucia*, 22 *Marginata*, 23 *Violacea*; on 8th May 11 *Lucia*, 18 *Marginata*, 14 *Violacea*; May 16, 4 *Lucia*, 7 *Marginata*, 3 *Violacea*. I would have been glad of many other statements, and should have received them had the season been propitious, but this one, made by an experienced and careful observer, and extending through several weeks, tells the story as completely as if a dozen had been sent me. Mr. Hulst further informs me that he happened to have a lot of these butterflies caught one day in the spring of 1881, 41 specimens in all. That of them 8 are *Lucia*, all but three having the patch of large size, 24 are *Marginata*, and 9 *Violacea*; and speaking in general of these forms as they appear at Brooklyn, he says that *Lucia* is common, *Marginata* takes in the bulk of the specimens, and *Violacea* is not unfrequent.

3. Rev. Thos. W. Fyles, of Cowansville, P. Q., sends a table of his captures:

On 22nd May, 3 *Marginata.*
" 27th " 2 "
" 31st " 1 "
" 2nd June, 4 " and 2 *Lucia.*
" 12th " 1 "

3. Eggs laid by *Violacea*, in April or early in May, in W.Va., produce *Neglecta*, in June, so far as known, but most of the

chrysalids hybernate. The eggs are laid on Dogwood, Cornus, in April. This was ascertained in 1878 only. On tying a female over the end of a branch, about 40 eggs were obtained within a few hours, laid among the flowrets. This was 14th April. The duration of the egg stage was 5 days, of the larval, 24 days, and the first pupation took place on the 13th May; on 6th June, or 24 days after pupation, there emerged a *Neglecta* ♀. The whole period, therefore, from egg to butterfly, was 53 days, and observations in successive years show that the duration of the egg and larval stages is just about the same as in the case stated; that is, 29 or 30 days. I have never had a butterfly from *Violacea* chrysalis except in this one instance. Some of the chrysalids of 1878 were alive late in the summer, and the presumption is, would have successfully hybernated, if I had had the skill to manage them properly. But about middle of September all were found to be dead. And in subsequent years, I have lost them without getting a butterfly. They either dry up or mould. In nature, these larvæ fall to the ground when full grown, and no doubt conceal themselves under sticks and stones for pupation. I made my plans for the present season (1882) to breed from *Violacea* and *Pseudargiolus* largely, with the hope of clearing up any yet obscure parts of their history, and received advice from Mr. William Buckler, of England, who has had great experience in rearing lepidopterous larvæ, as to the way of preserving a just medium between dryness and too great dampness with the chrysalids, but have been able to do nothing, getting neither eggs nor larvæ. Inasmuch as *Violacea* is so excessively abundant in April, it is not possible that the few late females of *Pseudargiolus*, which lay eggs in September, can be the parents of all this host, and I infer, in consideration of the fact that the hybernating chrysalids of the May generation (*Pseudargiolus*) produce their own form of butterfly only so far as yet known, and also that the larger part of the chrysalids of *Violacea* appear to hybernate, that nearly all the butterflies of the first generation must come in direct descent from their own form of the year before.

4. Eggs laid by *Pseudargiolus* produce the same form the same year in very small numbers, but most of the chrysalids hybernate to produce the same form the next spring. The few butterflies which emerge the same summer are sometimes as large as the parent female, but usually are smaller. I have never actually carried one of the chrysalids over the winter to imago in the spring, but there can be no doubt that *Pseudargiolus* of May come from hybernating chrysalids, and I will make it clear that any other assumption is impossible. The food plant of *Pseudargiolus* is Rattle-weed, or otherwise called black snake-root, Cimicifuga racemosa. That the females laid their eggs on this was only ascertained in 1877, and early in July, I had got about 30 chrysalids by raising the larvæ. (The duration of the several stages are as fol-

lows: egg, 4 days; larva, 19 at the least, or 23 days from laying of egg to pupation. From that to 28 days.) On 19th August, 1 ♂ *Pseudargiolus* came forth from chrysalis; 1 ♀ 1st September, and 1 ♀ between 3rd and 20th September, while I was absent from home. The other chrysalids were alive at the beginning of winter, but 19th February, 1878, were found, on examination, to be dead. I opened their wing cases, and most had the full color of *Pseudargiolus*, a few showing no color at all. It is well known that the color of a butterfly's wing begins to set but a short time before the imago is to issue from chrysalis, and when the color is complete the insect is ready to burst the shell. Most of my chrysalids then, at some date in the winter, had been fully ready to give *Pseudargiolus* butterflies, but just at that point they had died.

In 1878, I had a great number of larvæ. On one day, 19 June, I found 5Q. On 13th July, emerged 1 ♀; on 4th August, 1 ♂; on 10th August, 2 ♀; and no more issued. I had tried to keep these chrysalids damp on moss sprinkled with water, but on 12th September found that all were dead with mould.

In 1879, I carried upwards of 20 chrysalids, obtained in July, through the summer and fall, with no emergence except on 14th September, when a ♀ *Pseudargiolus* came out. The rest were alive in early winter, but were found to be dead 19th January.

In 1881, I had 3 chrysalids that certainly were alive 20th February, 1882, and that day they were removed from the house to the open air, the weather becoming moderately warm. This was with the hope that the butterflies would soon begin to come forth. But some time in March I found all of them dead. On opening the wing cases they proved to be 2 ♂ 1 ♀ *Pseudargiolus* in full color.

This season, 1882, I could get but two chrysalids, one of which formed 3d July, and gave a full-sized female 15th July, or after 12 days. The other, on 27th July, gave a medium-sized ♀ after but ten days pupation.

In corroboration of the observations based on the chrysalids, I will give others upon the appearance of the butterflies in the field, and these can have no other interpretation than that *Pseudargiolus* of May must come altogether from hybernating chrysalids. I recall the facts before stated, that the duration of the egg and larval stage in the first generation (or *Violacea*) is about 30 days, and that the only butterfly known to emerge from chrysalis proceeding from *Violacea* was *Neglecta*, after a period of 24 days from pupation, making 63 days from egg to butterfly. The egg was laid 14th April, and the *Neglecta* came out 6th June. Now it will be seen that year after year the first appearance of *Neglecta* has been in the early days of June, while *Pseudargiolus* has been on the wing, in fresh examples, at the time that *Violacea* eggs were being laid. In fact, *Pseudargiolus* is always plenty before the larvæ from *Violacea* eggs have reached chrysalis, and has totally disappeared when *Neglecta* begins to come on the stage.

1865, 22d May, took 3 *Pseudargiolus;* on 15th June, 3 ♂ *Neglecta*, the first seen.

1866, on 13th and 14th June, took 30 ♂ *Neglecta;* on 1st July, 1 ♀, the first seen.

1867, 11th May, took 6 ♂ *Pseudargiolus.*
1868, 1st " " 1 ♀ " the first example seen.
" 14th " " 14 ♂ ♀ "
1869, 29th " " 15 ♂ "
" 6th June " 1 ♀ " on 20th June took several *Neglecta.*
1870, 15th May, took 5 ♂ *Pseudargiolus.*
1877, 29th " " 3 ♀ "
" 2d June " several ♂ "

1878, 13th to 17th April, found the first eggs and nearly hatched larvæ of *Violacea*. On 19th, 20th, 21st April, took each day a fresh ♂ *Pseudargiolus*. On 1st May 5 ♂ ,and 3d May, recorded that the species was abundant. On 6th June, a *Neglecta* (before mentioned) came from chrysalis from *Violacea.* On 9th June, took several *Neglecta*, and recorded that no more *Pseudargiolus* were to be seen.

1879, 1st to 6th May, was daily finding eggs and larvæ of *Violacea ;* 9th May, took 1 ♂ *Pseudargiolus.*
" 11th " " 1 ♀ "

1880, 2d May, took 2 ♂ *Pseudargiolus:* On 30th May, took 23 ♂ *Neglecta.*

1881, 8th May, found the first larva of *Violacea* of the season; same day, saw first *Pseudargiolus* flying. 16th they were plenty; On 7th June, *Neglecta* were flying, fresh from chrysalis; took 5 ♂; on 22 June, they were plenty.

1882, April 6, took several fresh ♂ *Violacea* in a cluster on the ground, and with them were two ♂ *Pseudargiolus*, earlier by a month nearly than I had ever seen them.

The observations on the chrysalids and those on the appearance of the butterflies in the field therefore agree, and together show that *Pseudargiolus* of May cannot proceed from *Violacea* butterflies of that year, but must come from hybernating chrysalids. The later butterflies, *Neglecta*, which follow closely the others, and begin their flight about June 1, and are not in large numbers, as a rule, must come from *Violacea* butterflies of the same year. A small percentage of the chrysalids from *Violacea* give butterflies at fifty and more days from the eggs laid in April, which brings the emergence into June, and the result is *Neglecta*; while nearly all the chrysalids hybernate, as before said, to give *Violacea* the next spring.

In a paper in Can. Ent. Vol. X., p. 1, 1878. I stated my belief that *Pseudargiolus* proceeded directly from *Violacea*, and accounted for *Neglecta* by effect of climate, scarcity of larval food, etc. But later observations and a careful reading of my journals have led me to reject that theory.

Therefore, what is apparently the second generation is really but partially so. It is made up from two distinct sources, and the true second generation of the year in descent is *Neglecta*, proceeding, as it does, directly from the first generation, or *Violacea*. *Pseudargiolus* is an interpolated and distinct generation, the first in the year of its series. It has no direct connection with the winter forms, but an indirect one through the few individuals which spring from it late in the season, as I shall show.

I am not able to state what is the behavior of *Neglecta*, when it lays its eggs, or upon what plant. Inasmuch as, later in the year, only an occasional individual of the species is flying, and which can be accounted for as as the product of *Pseudargiolus*, it seems to me highly probable that all the chrysalids from *Neglecta*, which would be formed in July, go over the winter, to swell the hosts of *Violacea* in April.*

5. The few late females sprung from *Pseudargiolus*, and which emerge from chrysalis irregularly in August and September, lay eggs, and the chrysalids thereupon hybernate and produce *Violacea* in the following spring.

In September, 1873, Mr. T. L. Mead, then at Coalburgh, noticed a female laying eggs on flowers of Actinomeris squarrosa. From these two chrysalids were obtained, but they died during the winter. In September, 1874, I found a few larvæ on same plant, and got from them three chrysalids, from which emerged 13th February, 1875, three butterflies, 1 ♂ 2 ♀ *Violacea* (as related Can. Ent., VII., p. 82.)

In 1877, so late as 13 October, I found several larvæ on Actinomeris, and sent them to Dr. Hagen for observations on the honey-tubes. 1878, 11 September, I had 3 larvæ from same plant, but find no mention of the chrysalids later. 1881, 30 August, I found 2 larvæ on same plant, and obtained from them two chrysalids. These gave two females *Violacea*, on 2nd and 15th March,

---

* While correcting the proof of this paper, 30th June, I am able to add something to the history of *Neglecta*. From *Violacea* eggs, in April of this year, I obtained six chrysalids, which formed 19 May, and within one or two days after. To the present date, or at 39 to 41 days from pupation, no chrysalis has given butterfly, though *Neglecta* butterflies have come and nearly gone. *Pseudargiolus* was so scarce that I saw but one example, a female, which I caught while it was ovipositing on Rattle weed, on 5th June. From this, tied in bag, I got eggs, and this very day 3 of the larvæ therefrom have pupated, 1 on 28th, or at 23 to 25 days from laying the eggs. On the Rattle weed, previous to 16th June, I found a few eggs and larvæ of *Pseudargiolus*, from which I have 12 chrysalids. On 9th June, the first example of *Neglccta* butterfly was seen, a fresh male, and within a week there were many. And they have nearly disappeared, and examples taken since 25th have been worn. But at this date, 30th June, the Rattle weed is still abundant, and bids fair to continue in flower two weeks longer (or long enough for all larvæ now on it to mature), and I find plenty of young larvæ, which undoubtedly are from *Neglecta*. Since 16th June, I have found both fresh eggs and newly hatched larvæ. I observe that the chrysalids from eggs of *Pseudargiolus* are nearly twice as large as those of *Violacea*, averaging, length, .336 in., breadth of abdomen, .157 in.; while *Violacea* averages, length, .26 in and breadth .125. What the chrysalids from *Neglecta* measure I will ascertain in due time. But the little chrysalids of *Violrcea* will not produce the large butterfly *Pseudargiolus*, and the large chrysalis of the latter will not produce the little butterfly *Violacea*.

1882. So that certainly some *Violacea* come from the chrysalids of the late *Pseudargiolus* of preceding year. But, as before said, all cannot so originate. A. squarrosa has furnished very few larvæ, two and three in a season, in one case ten; but if all, or any large part, of the spring butterflies came from September larvæ, the plants would swarm with the latter.

This is the history of the species in W. Va. At the north, very little seems to have become known respecting any of the preparatory stages. But 8th June, 1878, I received from Prof. J. H. Comstock several larvæ, on Viburnum acerifolium, supposed to be from eggs laid by *Neglecta*. None of the chrysalids therefrom gave butterfly the same season, and all were dead by 12th December. I conclude that these chrysalids would, under natural conditions, have hybernated.

On the other hand, Mr. William Saunders, in Can. Ent., Vol. I., p. 100, relates that he found larvæ nearly full grown 12 July, on Cornus; and in Vol. VII., page 83, he further says, that of that lot of larvæ, 5 soon after pupation produced *Neglecta* butterflies. It is to be inferred that no chrysalids lingered, as no mention is made of such. Mr. Saunders says, that in his locality, London, Ont., there are two broods of *Neglecta*, one in May and June, the other in July and later. And the date of his captures, in several years, run from 14th May to 4th June; a much beaten specimen on 25th June. And fresh individuals had been taken 2d and 5th July, indicating a second brood. Mr. Saunders is confident that the winter forms of the species are not to be found in that region, not having been taken or seen, though there are many collectors at hand. At various points from W. Va. to Maine the winter forms and the flowering of Cornus come together, so that except for Mr. Saunders' confidence in the absence of these forms, I should infer that the eggs which produced these larvæ were laid by one of the winter forms. If that had been so, the second generation, *Neglecta*, would have followed the first in direct succession, with many of the complications seen in W. Va.

In Can. Ent., X., p. 129, Dr. E. C. Howe states, that at Yonkers, N. Y., (which is about two degrees to the south of London, Ont., and being on the seaboard, has a very much milder climate), he saw several pairs of *Lucia* in copulation April 19, and females *Lucia* were ovipositing on Cornus April 30 and May 4, 1878, and he saw *Neglecta* males flying on April 19 and 22 that year. That single mention raises a curious point. It is plain that these *Neglecta*, flying with *Lucia*, must have come from hybernating chrysalids, as truly as did the *Lucia*. The history of these *Neglecta* would appear to be identical with the history of *Pseudargiolus* in W. Va., and they represent the southern form, and are interpolated in the series just as *Pseudargiolus* is. In fact, these early *Neglecta* would be very small *Pseudargiolus*, though perhaps undistinguishable from the examples of *Neglecta* which come in direct descent from *Lucia* and appear later. Mr. Lintner's observations lead to the same conclusion, though confined almost wholly to *Neglecta*. He has found this form between May 12 and middle of June, in successive years. On June 9 observed four pairs in copulation. His only *Violacea* recorded appeared May 12 and 19, and same year *Neglecta* was flying from May 16 on, so that the two forms were contemporary in part of their periods. As above stated, Mr. Saunders shows two broods of *Neglecta*, the later one flying in July and August. I have taken *Neglecta*, at Hunter in the Catskills, September 8. There was no general flight, but here and there a butterfly. It is much to be hoped that further observations may be made by some of our northern lepidopterists on these forms.

As stated, I have received from Montana males of *Violacea* and *Marginata*, and both sexes of *Neglecta*; from northern Colorado, *Lucia* and *Neglecta;* from southern Colorado, *Violacea* and its black male, and both sexes of *Neglecta;* from Nevada *Pseudargiolus*, from Arizona a form slightly differing from *Violacea*, which I have called *Cinerea;* from southern California, *Neglecta* ♂ ♀; from Mt. Hood, Oregon, a female very near *Neglecta*.

[But nearly all the Pacific examples, and many from Arizona, are what Dr. Boisduval names *Piasus*. They expand from 1 inch to 1.3; in color, the males are violet-blue, the under side not quite white, but color of *Neglecta* of the Atlantic slope, and the markings are as in that form, pale but distinct. But the females are not often like those of *Neglecta*. The blue of the disk is duller than in the males, and there is no white as in the two forms named; the black border is confined to the hind margin, as in many *Lucia* and *Violacea*. The costal margin is blue in many examples; others have a fuscous wash over costal margin, and both these winter variations are found in the eastern winter forms, but not in *Neglecta*. The under side is usually more like *Neglecta* than *Violacea*. But with 12 ♀ ♀ sent me by Mr. W. G. Wright, came 1 ♀ closely approaching *Neglecta*, in the black borders to both margins, and to *Violacea* in the indistinct markings of under side. The upper side is deep blue, with no trace of white on disk, and therein also it differs from *Neglecta*. The female before spoken of, from Mt. Hood, is much the same as this from south California. *Piasus* evidently stands between *Violacea* and *Neglecta*. Some males in the shade of blue cannot be separated from *Neglecta*, nor can they in the appearance of the under surface, and therefore I have tabulated this form as found in California. *Piasus* first appears at San Francisco, according to Mr. Henry Edwards, "about the end of March or the beginning of April, as soon as the peach and cherry trees are in blossom." It is his opinion that in that locality there is but one annual brood of the larva. He says that there is absolutely no green vegetation in the lowlands of California after July, and there would be nothing for larvæ later than this to feed upon. Mr. Wright, at my request, has watched the appearance of *Piasus* the present season, 1883, at San Bernardino, southern California, and has sent me many examples (35 ♂ 12 ♀). Evidently, there, there are two distinct broods. The first examples were taken in February and March, the last from 18th April to 2d May. All of a sudden the species became abundant from 18th April, after an interval of several weeks, during which none were seen. I find no perceptible difference between the ♂ ♀ of the two broods, except that in the earlier one appears the female before spoken of, which resembles *Neglecta* instead of *Violacea;* of the males, there are several individuals, which, if taken in W. Va., I should consider *Neglecta.* As I look at the matter, *Piasus* is probably an offshoot of *Neglecta* or *Pseudargiolus*, and occasionally there is a reversion to *Violacea* in some characters.]

Summing up the facts as related, with such inferences as the best observations at command will justify, the history of the species treated of will take shape as follows:

1. The winter generation, in its most northern localities, is one-brooded, and at same time dimorphic; *Lucia* and *Violacea.*

2. At a certain line, moving southward, say at or about lat. 45°, on the Atlantic, a second generation, *Neglecta*, appears; and the first, or winter, generation has become trimorphic: *Lucia*, *Marginata*, *Violacea.*

3. At another line, say at or about lat. 38°, on the Atlantic, two of the forms of the first generation are suppressed, viz.: *Lucia* and *Marginata;* and an entirely new form comes in, restricted to one sex: viz., the black male of *Violacea.*

3. But in lat. 40°, at the west, in Colorado, at high elevation, the original dimorphism prevails, *Lucia* and *Violacea;* though the latter has acquired the black male, identical with that of the east.

5. At another line, say about lat. 33°, in Arizona, *Violacea* is replaced by a modified form, *Cinerea*, and the black male apparently has disappeared.

6. On the Atlantic, from about lat. 40° or 39° and south, a second summer form is interpolated: viz., *Pseudargiolus*, from which proceeds a partial generation only the same year.

7. This partial generation produces chrysalids, which hybernate, and in the spring disclose a part of the butterflies of the first generation, or *Violacea.*

8. But most of the butterflies of the first generation are directly descended from the first generation of the year before.

9. The first generation produces a partial second the same year: viz., *Neglecta*, and this probably produces chrysalids which hybernate to give butterflies of the first generation in the spring. The first generation is therefore made up from two and, probably, three distinct sources.

10. The interpolated summer form, *Pseudargiolus*, is very

much independent of the first generation, and the latter is very much independent of its second generation, as well as of *Pseudargiolus;* and, therefore, if at any point, either was suppressed, the other could exist, and would solely represent the species. Which accounts for the form *Piasus* on the Pacific, or for the single form *Neglecta* at London, Ont.

NOTE.—Prof. Lintner, Can. Ent., VII., p. 122, 1875, stated that *Lucia* had never to his knowledge been taken in the vicinity of Albany, N. Y., or in that well-worked region, Centre, N. Y.; but that, at the latter locality, in some seasons *Negelcta* swarms in myriads: "the air has seemed blue" with them. On the next page, in a foot-note, it is said: "Since the publication of the above, L. *Lucia* has made its appearance for the first time at Centre. Examples of it were captured by Mr. W. W. Hill on the 16th May, 1876, at this locality, where it was also captured on the 13th, 20th, 26th May (5 specimens)."

In a letter to me of 22d July, 1882, Prof. Lintner says: "*Lucia* is increasing here. A young collector showed me an example taken this spring on the other side of the Hudson. He says he saw several more." Mr. Lintner also sends me a ♀ *Violacea* taken in the Heldeberg Mountains, which are west of and near Albany.

It is plain therefore that *Violacea* and *Lucia* do fly in that region, but just as plain that the flight must be a very insignificant one, and that it cannot possibly be the parent of the vast swarms of *Neglecta* described. The latter must come almost wholly from *Neglecta* chrysalids of the year before.

In Butterflies of N. A., Part XII., to be issued this season, I shall devote two plates to the species here treated of, with all its forms and many variations; also with full larval of history.

THE LEAF-ROLLERS OF ILLINOIS.

By D. W. Coquillett.

The following leaf-rollers were bred by me while living at my old home near Woodstock, Ill.; they all have sixteen legs and belong to the families *Tortricidæ, Tineidæ* and *Pyralidæ.* The Tortricids were determined for me by Prof. Fernald; the Tineids by Prof. Fernald and Lord Walsingham, and the Pyralids by Mr. Grote, and I would hereby acknowledge my indebtedness to these gentlemen for aiding me in this direction. I have appended to each description the initial letter of the person who determined the imago for me.

DEPRESSARIA PULVIPENELLA. *Clem.*

Body green, sometimes a darker dorsal line and sub-dorsal stripe; piliferous spots green; cervical shield green with a black dot on each outer edge; anal plate edged behind with black, this sometimes broken at the extreme posterior end; spiracles brown; head green, dotted or mottled with pale brown and marked with a dot on each side above the jaws; length from 17 to 18 mm. Lives on *Solidago rigida* and *Solidago sp?* in a leaf rolled lengthwise. Several specimens examined. One pupated June 27, and the imago issued July 11. Several others were found June 23, one of these pupated June 29, and the imago issued July 13. (F.)

DEPRESSARIA ATRODORSELLA. *Clem.*

Body green; a dorsal line and sub-dorsal stripe very dark green, blackish, or brown; piliferous spots and spiracles dark brown or black; cervical shield yellowish-green, with a black spot on the middle of each outer edge; anal plate sometimes edged behind with black; head yellowish-brown, with two black dots on each side, one near the jaws and the other next the anterior edge of segment one; length 18 mm. Lives on *Bidens frondosa* in a leaf folded lengthwise. One found June 21 pupated about a week later and the imago issued July 15, another was taken July 1 and a third July 4; the date when these pupated is not known, but one imago issued July 31 and the other August 9. (F.)

DEPRESSARIA GROTELLA. *Robs.*

Body green, darkest dorsally; cervical shield green unmarked; head green, with a black dot on each side above the jaws and sometimes with one or two black spots on each side near the top; length 17 mm. Lives on hazel (*Corylus americana* in a leaf rolled from the apex toward the base, or in a nest formed by fastening several leaves together with silken threads. Found several May 27; one pupated June 7 and the imago issued June 28; another pupated June 20 and the imago issued July 9. (F.)

DEPRESSARIA HILARELLA, *Zeller.*

Body green; a dark green dorsal and sub-dorsal line; piliferous spots green; spiracles brown; cervical shield and anal plate green, unmarked; head green, tinged with yellowish-brown; length 14 mm. Lives on *Sanicula marilandica* in a leaflet folded lengthwise. One found June 21 pupated July 2 and the imago issued July 17. (W.)

GELECHIA DISCOÆCELLA. *Chambers.*

Body, cervical shield and anal plate green, unmarked; piliferous spots and spiracles concolorous; head green, sometimes with a black dot on each side above the jaws; length 16 mm. Lives on *Polygonum pensylvanicum*, *P. convolvulus* and yellow dock (Rumex sp.?) in a leaf folded lengthwise, or beneath a web spun upon the upper or under surface of a leaf. One pupated June 13 producing the imago June 20; another pupated about June 27 producing the imago July 7; another pupated about August 9 and the imagos emerged August 18 and 22. (W.)

GELECHIA AGRIMONIELLA. *Clem.*

Body pale greenish-white; piliferous spots polished black;

cervical shield yellowish-green, with two dorsal black dots near the posterior edge; spiracles ringed with brown; head pale yellowish-brown, with a black dot on each side above the jaws; anal plate unmarked; length 10 mm. Feeds on *Agrimonia eupatoria*, living in a leaf rolled lengthwise, or from the apex toward the base, or in a nest formed by fastening several leaves together with silken threads. Two pupated about June 7 and the imagos issued June 28. (W.)

GELECHIA TRISTRIGELLA. *Wlsm.*

The only difference observable between this and the above larva is that the thoracic legs in the present species are black, with whitish joints, while in *agrimoniella* they are greenish, sometimes tinged outwardly with pale brown; in the present species the spiracles are situated on the lower edge of the third piliferous spots on the abdominal segments, while in *agrimoniella* they are placed below these spots; length 15 mm. Lives on hazel (*Corylus americana*) in a tube formed by rolling a leaf from the apex toward the base, the tube is closed at each end as if done by pinching the upper and lower part of the tube together with the thumb and finger. The excrements of the larva are retained in the tube, and when about to pupate the larva crawls into this excrementitious mass and forms an oblong cavity which it lines with a very thin layer of silk. Two pupated June 21 and the imagos issued July 5. (W.)

GELECHIA RHOIFRUCTELLA. *Clem,*

Body green; piliferous spots polished black; cervical shield blackish; anal plate unmarked; head yellowish-brown, shaded with blackish; length 16 mm. Lives on poplar in a leaf rolled lengthwise and closed at each end. (According to Chambers it also lives on the fruit racemes of sumac. *Food Plants Tineina, page* 109.) One pupated June 12 and disclosed the imago June 30. (F.)

DICHELIA SULFUREANA. *Clem.*

Body green; piliferous spots whitish; spiracles ringed with brown; cervical shield green, or yellowish-brown edged each side with dark brown; anal plate unmarked; head yellowish-brown, with a black dot on each side above the jaws; length 16 mm. Lives on *Verbena hastata** in a leaf folded lengthwise. One pupated about June 18 and the imago issued June 17; another pupated July 6 and produced the imago July 11. (F.)

CENOPIS RETICULATANA. *Clem.*

Body green; piliferous spots whitish; spiracles concolorous; cervical shield yellowish-brown, edged each side with black; a black spot on each side of the anal plate; head yellowish-brown, with a black dot on each side above the jaws and a black streak back of this; length 18 mm. Lives in a folded leaf on *Chenopodium album*, and *Geranium maculatum* (According to Miss Murtfeldt it also feeds upon the rose. *Am. Ent. vol.* III., *page* 14). One pupated July 6 and disclosed the imago July 17. (F.)

---

* According to Dr. Packard it also feeds upon *Pinus strobi* and *Pinus rigida* (PAPILIO, Vol. I., p. 182); while Prof. Comstock gives its food plants red and white clover, locust, strawberry, grape, cotton, orange and willow (Rep. Cam. Agr., 1880, p. 256).

TERAS PERMUTANA. *Dup.*

Body green; a dark dorsal line; a light-colored stigmatal line; sutures of segments sometimes yellowish; cervical shield wanting; anal plate unmarked; piliferous spots concolorous; spiracles ringed with pale brown; head green, unmarked; length 19 mm. Lives on willow, binding two or more terminal leaves loosely together with silken threads. One pupated about June 13 and the imago emerged June 27. (F.)

TORTRIX QUERCIFOLIANA. *Fitch.*

I can find no difference between this larva and that of *Gelechia discoœcella* described above. It feeds upon wild blackberry (*Rubus villosus*), living under a web spun upon the upper surface of a leaf. One pupated June 21 and the imago issued July 4. (F.)

TORTRIX PALLORANA. *Robs.*

Body green; piliferous spots concolorous; spiracles faintly ringed with pale brown; cervical shield green, unmarked; anal plate unmarked; head green, a black dot on each side above the jaws; length 18 mm. Lives on cherry, *Silphium integrifolium* and *Verbena hastata.* One pupated June 16 and disclosed the imago June 27; a third pupated July 25 and the moth emerged August 4. (F.)

CACOECIA SEMIFERANA. *Walk.*

Body green; piliferous spots and spiracles concolorous; cervical shield green, with two dorsal black dots on the posterior edge and a black dot on each side near the head; head green, with a black dot on each side above the jaws; anal plate unmarked; length 17 mm. Lives on knot grass (*Polygonum aviculare*). One pupated June 10 and the imago emerged June 20. (F.)

LOXATÆNIA ROSACEANA. *Harris.*

Body green; piliferous spots light colored; spiracles faintly ringed with pale brown; cervical shield brownish-black, sometimes shaded with green next the head; or green, surrounded at the sides and behind with black, or bordered on each side with black, this sometimes reduced to a dot or dash near the anterior or posterior end; or green, bordered behind with black; or yellowish-brown, surrounded at the sides and behind with black and with two dorsal dots of the same color near the anterior edge; head blackish-brown, the upper part of the face sometimes tinged with brown; or yellowish-brown, sometimes tinged with green and with a black dot and streak on each side, one or both of these marks sometimes wanting; anal plate unmarked; length about 20 mm. I have bred this species from larvæ found feeding upon the apple, cherry, Siberian crab-apple, lilac, horse-chestnut tame raspberry, wild strawberry, wild rose (*Rosa blanda*) burdock (*Lappa officinalis*), thistle (*Circium lanceolatum*), red clover (*Trifolium partense*), ragweed (*Ambrosia artemisiæfolia*), smartweed (*Polygonum pensylvanicum*) and knotgrass (*P. aviculare*) and have found it on burr oak, poplar, hazel (*Corylus americana*), sumac (*Rhus glabra*), wild raspberry (*Rubus strigosus*) wild blackberry (*R. villosus*), horse radish, wild sunflower (*Helianthus grosse-serratus*) and blue vervain (*Verbena hastata*); and Dr. Packard has found it upon *Betula populifolia*,* making in all twenty-four different species of plants. It remains in the chrysalis state from five to eleven days, and two broods are produced in one season. (F.)

PENTHINA NIMBATANA. *Clem.*

Body green; spiracles and piliferous spots concolorous; head and cervical shield polished black; anal plate unmarked; length 15 mm. Lives in a folded leaf on *Rosa blanda*. Two were taken the first week in June; they pupated a few days later and the imagos issued June 20 and 21. (F.)

BOTIS OSCITALIS. *Grote.*

Body green; piliferous spots concolorous; spiracles ringed with pale brown; cervical shield green, edged at the sides and behind with black, that on the sides sometimes wanting; head mottled black and white; anal plate unmarked; length 16 mm. Lives in a folded leaf, or between two leaves folded together with silken threads, on willow and poplar. Found several in the latter part of July and again about the middle of August; one pupated July 27 and the imago issued about August 8. (For the generic determination of the imago I am indebted to Mr. Grote; the [single] specimen bred by me agrees very well with his description of *oscitalis* [Can. Ent., Vol. XII., p. 36], and as one of his specimens was from Ohio it is not improbable that the species ranges westward as far as Illinois).

BOTIS GENEROSA. *G.* and *R.*

Body green; piliferous spots and spiracles black; above the spiracles is a black stripe on which is a row of large, raised, polished black spots, those on the segments two and three the largest; head and cervical shield greyish-brown, the latter edged each side with black; anal plate unmarked; length 10 mm. Lives singly on *Monarda fistulosa*, webbing the terminal leaves together. One found June 17 pupated June 30, and the imago issued July 18. (G.)

PENTHINA HEBESANA. *Walker.*

Body green; piliferous spots and spiracles concolorous; head and cervical shield polished brownish-black; anal plate unmarked; length 11 mm. Lives singly on *Stachys palustris*, binding the terminal leaflets together. Found many larvæ and two pupæ June 24. One imago issued June 30. (In the Amer. Ent. Vol.

---

* PAPILIO, Vol. II., p. 182.

II., p. 204, Mrs. Mary Treat states that this species [under its synonym, *P. Fullerea*, Riley] feeds upon the cultivated Verbena, and quotes an article in which Prof. Riley states that he bred it from a Tigridia or tiger-flower), and on p. 371 Miss Murtfeldt states that she has bred it from *Antirrhinum*. (F.)

EUDEMIS BOTRANA. *S. V.*

Body purplish or dull greenish; piliferous spots and spiracles concolorous; cervical shield blackish, usually tinged with brown next the head; head brown, with a black dot and streak on each side; anal plate black; length 11 mm. Lives in the flower buds of the thistle (*Circium lanceolatum*). According to Miss Murtfeldt it also feeds upon the rose (Amer. Ent., Vol. III., p. 14), and many authors state that it also infests the grape, it being the well-known *Penthina vitivorana* of Packard. Riley describes the grape-feeding larva as having the head and cervical shield honey-yellow, the latter with a darker posterior margin (First Rep. Ins. Mo., p. 135). Found a great many June 24; two moths issued July 8. (F.)

BOTIS INSEQUALIS. *Guen.*

Body dull yellowish-white, usually tinged dorsally with pinkish; piliferous spots and spiracles deep brown; head and cervical shield pale yellowish-brown, mottled with deep brown; anal plate unmarked; length 13 mm. Lives on thistle (*Circium lanceolatum*) in a silken tube spun beneath a leaf fastened to a branch or to the stem; before pupating they desert their burrows and spin their white cocoons among the leaves. Found many larvæ and pupæ June 17; the moth issued June 28. (G.)

EXARTEMA (ECCOPSIS) PERMUNDANA. *Clem.*

Body green, usually clouded dorsally with dull leaden; first segment brownish; head and cervical shield black or pale brownish; pilferous spots and spiracles concolorous; anal plate unmarked; length 15 mm. Feeds on Siberian crab-apple, tame raspberry, wild blackberry (*Rubus villosus*) and hazel (*Corylus americana*) [and *Spiræa*, Fernald, *teste*, Comstock, Ag. Rep., 1880, p. 268]. Lives in a leaf rolled from the apex to the base, or between two or three leaves fastened together with silken threads. Found a great many May 30; one pupated June 12 and the imago issued June 30. (F,)

LOXATÆNIA (CACŒCIA) CERASIVORANA. *Fitch.*

Body light yellow; piliferous spots, head, cervical shield and anal plate brownish-black; spiracles ringed with pale brown; length 14 mm. Lives on choke-cherry (*Prunus virginiana*) in a nest formed by fastening the terminal leaves together with silken threads. Found a great many in the latter part of June; six moths issued July 7. (F.)

NOTHRIS TRINOTELLA. *Coquillett.*

Body dark purplish-brown, that below the spiracles pale greenish-brown; two broken, indistinct white dorsal lines, and two similar stigmatal ones, the one below the spiracles the most distinct; piliferous spots black, usually situated on white spots; spiracles black; head and cervical shield yellowish-brown; anal plate unmarked; length 18 mm. Lives in a folded leaf on hazel. One found June 28 pupated July 4 and the imago issued July 21. (The imago was determined generically by Lord Walsingham. I sent a sketch and brief description of it to V. T. Chambers, who wrote me that he was not acquainted with the species and believed it to be new. Accordingly I have given it the above name and send a description with this paper). See PAPILIO, Vol. 3, page 81.

CAPITALIZING SPECIFIC NAMES.

Although Prof. Riley's note in March No. p. 63, is addressed to the Editor, as I must be one of the sinners in his estimation, perhaps I may be allowed the opportunity to say a word in reply, so far as concerns myself particularly. I will repeat the Professor's words and italicise somewhat, so as to bring out the points he makes in this curious note. "Can the editor inform me *upon what grounds* and for *what purpose American lepidopterists have recently adopted the vicious habit of capitalizing the specific names of their insects?* The *tendency* among the entomologists generally has *been in the other direction*, etc. * * * * The prime object of nomenclature *being to facilitate study* and *thought*, this last fashion has everything in its favor. The capitalizing of specific names is almost as bad and *fully as unnecessary and confusing* as, etc. * * * * If there be any sound defence of the custom I should like to know it."

This reads as if some sort of function attached to the office of Entomologist in Chief at Washington and it were his duty to have an eye to entomological obliquities of all sorts. He wishes to be informed "on what grounds and for what purpose," etc. I hasten, not knowing what may be the next step, to state in defence.

1. The Professor may rest in peace; my "purpose," for one, is not wicked. It is neither nihilistic nor revolutionary, and I hope no cat under the meal or moral dynamite is suspected. I capitalize the names of species because it is the only proper thing to do. If the specific name is that of a person, of course, it is entitled to a capital. I refer the Professor to the next grammar for light. If it is a common noun or an adjective, which is used as a proper noun, it also is entitled to a capital. If John Smith sees fit to give the name "Faith" to one of his daughters, we should not write "Smith miss faith," any more than "Riley professor charles, etc." If John Jones calls his boy "Zealous)"

we should not write the name with a small letter because of its being an adjective. Argynnis stands for the surname and Diana for the christian name. If the name of a person, when applied to a species, is not a proper noun, then it is a common noun, and in most cases could have no meaning; in fact, would be nonsense. If Diana in such usage is not the name of the goddess, then it is no word at all, but a chance collection of letters, and we might as well spell it backward and say Argynnis anaid.

2. The usage is NOT a recent one. Linnæus uses capital initials for all proper names; also for such names as *Quercus*, *Pini*, *Urticæ*, *Caricæ;* but for such as *crepuscularis*, *ocellata*, not; apparently excluding adjectives.

Fabricius, in usage, follows Linnæus.

Kirby, so late as 1871, Suppl't 1877, and Staudinger, 1871, use capitals for all names. So does Hewitson (Exotics); and Felder (Spec. Lep.). Westwood (Drury) for all names, except adjectives. Boisduval, in Spec. Gen., and Ind. Meth. gives capitals for all names; in Lep. de la Cal., adjectives all given with small initials. Harris, Ins. Inj., has proper names in caps., adjectives not, but *semidca* has small initials, though *comma* and *interrogationis* have large, so that I do not discover any fixed rule. The Ent. Mo. Mag., from first to latest volume, for all orders, capitalizes proper names used for species.

The Rules of British Assn. on Nomenclature are silent on this point.

The fact is, the usage which Prof. Riley advocates is the innovation, and so far as relates to names of persons, it is a very recent one, and but partially prevalent. There is no "tendency in that direction." Some persons are always to be found who are ready to jump at any new thing. I could instance several recent entomological fashions. In the present case, some one has started the usage of a small initial letter, and has found his followers. By and by the fashion will set in some other direction, perhaps to old English initials. Who can tell? But many persons do not shift about with every wind.

As to calling the old way "vicious," why may I not as sensibly call the new way "vile?" I do, indeed, detest and abominate it, and when the genus name is also given with a small initial, words cannot express my sense of the iniquity. As to a small initial letter "facilitating study and thought," as if it were a little pill to be taken after meals, that is beyond my comprehension. I may as reasonably say that the use of small letters where they ought not to be, making me mad at the perversity of the editors who use them, distracts my mind and impairs my mental digestion. Therefore, if Prof. Riley would have kind consideration in such cases as mine, and would desire to facilitate study and thought, while avoiding what is "confusing," I beg that he will henceforth reform his ways and modestly follow the usage of the fathers. W. H. EDWARDS. Coalburgh, W. Va., April 20, 1883.

With the permission of the editor of "PAPILIO" I wish to make a few remarks in reference to the question raised by my friend, Mr. Riley.

Formerly many writers used capital letters for specific names, at least in the case of proper names or adjectives derived from them ; but lately the practice has generally been to write every specific name, without exception, with a small letter, and to this rule I am obliged to conform in much of my own work.

Personally, however, I always prefer to commence specific names with a capital letter, and in independent work (such as my Catalogue of Diurnal Lepidoptera, for example) I use capitals for all specific names. It is a matter of convenience, not of principle, although, as regards the latter, a specific name is as much part of the name of the species as the generic name, and equally well entitled to be printed with a capital letter; but in lists of species capital initial letters catch the eye so much more readily than small letters, that I would never advocate the use of the latter. On the other hand, except in columns or series, no specific name should ever stand by itself without, at least, the initial letter of its genus before it. W. F. KIRBY, Zoological Dept. British Museum, April 30, 1883.

Staudinger spells the species with a capital, and it seems to be the practice in England. I am like the old man with the ass in the fable. When I quoted the author of the combinations, like Le Conte and Packard, Prof Riley called my list "immoral." Now, I have a "vicious habit," though I have abandoned the custom first complained of. Mr. W. H. Edwards spells the specific names of the butterflies with a capital. I suppose what holds for the one does for the other. Is there anything else? A. R. GROTE.

ERRATA.

The following sentence in my communication on the capitalizing of specific names (p. 62) was written with the bracket portions and should be so read. "The capitalizing of specific names is almost as bad and fully as unnecessary and confusing as the use of the lower-case letters [for generic names] which has come into vogue among some catalogue[r]s." C. V. RILEY.

A RECENT SOUTH AMERICAN PAPER ON MOTHS.

By Aug. R. Grote.

I have received from its author, Sen. Carlos Berg, a pamphlet of fifty-six pages, in large octavo, without plates, entitled "Farrago Lepidopterologica," being a contribution to the study of the fauna of the Argentine Republic. Its perusal has only intensified the feeling I have long had (since studying the Cuban moths) that we need a knowledge of the South American species to get a proper idea of our own. I have shown what a strong Southern admixture there is in our Sphingidæ and in other groups the same or a similar state of things will be found to exist. While some genera (*Catocala*) have not crossed the tropics, *Plusia biloba* is found from Canada to Chili. The mass of equatorial forms are not known to us in the United States to any extent. The collection of the British Museum must be studied. We must depend now largely on Mr. Butler to give us information.

A few points I must discuss with Sen. Berg, chiefly concerning the terminology adopted by him. He uses *Euthisanotia* instead of *Eudyras*. He is wrong in considering *Xanthopastis* as = *Euthisanotia* (*Timais*, etc.) It is a composite genus in the Verzeichniss, containing five ill-assorted species. Hubner takes *timais* and associates it with *Unio* in the *Zutrage*, leaving Boisduval free to erect a genus for *Unio*. Whether *Unio* was published by Hubner before he refigures *Timais*, my notes do not tell me, and I have not the Zutrage at this moment. It is of no consequence, because the genus is not adequately founded. *Eudryas* is first properly limited by Packard. It contains three North American species, *Unio*, *Grata* and *Sta. Johannis*. Berg's new species *Platensis* is, if I understand his remark as to the front, no *Eudryas*, perhaps a *Copidryas*. Hubner evidently considered *Timais* and *Unio* as congeneric, and differing from *Xanthopastis*. He associates them, and Boisduval's term must on all accounts be kept for our North American genus. Again, I would like to know how *Megalopyge* is substituted for *Lagoa*. Harris had a perfect right to establish his genus in 1841, because Hubner has two species in *Megalopyge* and if the first (*lanata*) is a *Lagoa*, what is the second (*Nuda*)? Where Hubner has more than one species, the person who separates them has clearly the right to take any. The first is not Hubner's type, by any rule of zoological nomenclature. The "el tipo del genero *Megalopyge*" is an assumption of Sen. Berg's. The right name of the genus is *Lagoa* (= *Pimela*, Clem.). Whatever Abb. and Smith's species are *Crispata* of Packard is distinct and valid. I believe that Abbot's figures may not represent a different species. I have positively identified *opercularis*. My fresh Georgia specimen is in British Museum so labeled. Rubbed Texan specimens may be "*Pyxi-*

difera," but I doubt it. In any event, *Crispata* is *not Opercularis*, which is much darker, mixed with brown and black crinkled hairs on fore wings. *Lanuginosa* may be = *Pyxidfiera*, but Clemens' type was rubbed, and rubbed specimens look deceptive in this genus. It is not certain that we have three species, but it is certain that *Crispata* is *not Opercularis*. Again, my *Carama Cretata* from Louisiana, is probably an older name for *C. Walkeri*, Butl. The British Museum specimens determined by Walker as *Sparshallii* were, to my belief, in part, at least, belonging to my *Cretata*, I did not compare them but, on my return, referred my species to *Carama*, of which genus I was unaware when I described my insect. Again, Sen. Berg is probably right as to the derivation of *Halisdota*, but I wrote it as Hubner did, and certainly, "Halesidota," a spelling I corrected, is wrong. By the way, my genus is *Eupseudosoma* not "*Euspseudosoma*," as Sen. Berg has it several times. I am a little surprised that the Cuban is the same as the South American species. The one from Florida appears distinct, but may only be a local modification. I am decidedly of opinion that species showing differences, such as we know sometimes to be specific, as shown by well-marked insects, should not be lost sight of by being united under one species' name. It seems as if now creationists were practically trying to condense the idea of "species," after its being shown that the idea of "species," as formerly entertained, as exclusive, is overstepped in Nature, they get over the facts by calling the so-called "*species Darwinianæ*," "varieties," or "all the same." Varieties are nascent species, undoubtedly, but where the forms are not proved to intergrade in all stages, the distinct names should be allowed to them. It is difficult to draw the line where we only know the perfect stage; it is better to let the names stand in lists till we know all the history, and then we can express the real dependence of the forms more exactly. A certain class of varieties are readily recognized as such, but I am speaking of cases like *Psi* and *Occidentalis* in the moths, or even *Gentilis* and *Perbellis*. From Sen. Berg's interesting pamphlet I learn that the genus *Metagarista* occurs in South America. I infer that this name is more correct than *Phægarista*. I only know the East Indian *M. Transiens* and our own *M. sevorsa* from Arizona. It is a matter of congratulation that we have so conscientious a Lepidopterist as Sen. Berg in South America. In the matter of nomenclature, however, I would respectfully suggest that I have never taken a name of Hubner's without great care, and I would recommend Sen. Berg not to attempt to displace a well-established generic title upon anything but the surest grounds.

With regard to the vexed question of Hubner's genera I have endeavored to meet the views of those who adopt and those who reject his genera to this extent: 1. Where a Hubnerian genus has been used by another good authority I have retained it in preference to a later name. Example: *Glaea*, as used by Stephens ; *Trigonophora*, as used by Lederer. 2. Where a genus has received a name as previously employed in a different sense by Hubner, I have used the correct Hubnerian designation. Examples: *Lithophane*, *Eustrotia*, *Bombycia*. 3. Where the genus has the same, or nearly the same limitation, with the addition merely of species since Hubner wrote. Examples: *Tolype*, *Habrosyne*, *Anisota*, *Citheronia*, etc. I have only used a Hubnerian name, applied in an indiscriminate manner in the "Verzeichniss," in cases under 2. as above; thus the question of what of a number of species was Hubner's type is much simplified. I have else preferred the later names, such as *Bryophila*, *Tæniocampa*, when to restore Hubner's name might cause confusion or lead to dipute. Although a contrary impression may be circulated, it will be found that in my "New Check List," and in the groups of which I have studied the literature and structure, the above limitations will generally cover my use of Hubner. I have "resurrected" none of Hubner's names without long study, and really I don't think I have myself brought a dozen in all into use again. I refer to the preface of my first Check List of the *Noctuidæ* for the argument as to Hubner's genera and the attacks made on them. I see now more closely the importance of keeping a well-known term at the expense of Hubner, but as I have not been extreme in my action, there are but few names for me to retract. If the genera as now adopted by myself are mostly confirmed, as I think they will be, the controversy will be shortened by so much. I have been explicit in this paper without regard to a defense of myself, in order to correct the impression to be gathered from some sources, that every slight structural difference is regarded by me as generic, every color variation as specific, and that I have rehabilitated every generic name in the "Verzeichniss" or "Tentamen." These charges are made by those who do not care to investigate the subject, their object being to rise by criticising others. It would be easy to prove them guilty of what they charge upon me where they have ventured so far into print. In one case the "variety species controversy" is simply used to cover up the real matter of the discussion, as is doubtless well known by all who take an interest in these questions, unfortunately inseparable from the study of Insects.

THE MACHAON CONTROVERSY.

By H. H. Lyman.

I have been very mnch interested in reading Mr. W. H. Edwards' able article in the March number of "Papilio," in refutation of Dr. Hagen's theories of the identity of *P. Machaon* with *P. Oregonia* or *Zolicaon*, and knowing the *penchant* of the learned doctor for simplyfying (?) matters entomological by lumping somewhat similar forms under a single name. I can sympathize with Mr. Edwards' dismay at the idea of the worthy Doctor sitting down to revise the North American butterflies in this fashion. Attention, however, may be daawn to the fact that Mr. Edwards' opinions upon this subject have not always been the same, for in Butterflies of North America, Vol. II., part 3, he concludes his description of one of these forms, as follows: *Zolicaon* belongs to the *Machaon* group,,' while in his recent article he proves to a demonstration that "*Zolicaon* has no present relations with the *Machaon* group, standing wholly apart from it" and belonging to the *Asterias* group. But my object in writing is not to criticise either of these learned gentlemen, but to describe what I suppose must be a rather remarkable specimen of *Zolicaon* which I possess. This species is represented in my cabinet by two specimens only, ♂ and ♀, which were received from Nevada. The ♂ is of the ordinary type, as figured and described by Mr. Edwards, but the ♀ differs from the type in several particulars.

1. It is very large. In But. N. A., Vol. II, part 9, Mr. Edwards says that a ♀ expanding very nearly four inches is unusual, while my specimen expands 4 1-12 inches.

2. The secondaries above are black at base, more than a third of the cell being of this color.

3. The body has the lateral yellow bands broader than usual and there are three yellow stripes beneath, separating the black into four bands, as in *Oregonia*, only the black stripes are decidedly broader than the yellow ones, and the two middle black bands are united for about half the length of the abdomen.

The pupil in the ocellus is distinct, nearly round above, but rather triangular below. The cell on primaries below is black, with two yellow bars, the inner one dilated towards the median nervure, and otherwise the specimen is normal. I suppose it may be set down as a case of reversion.

REPLY TO DR. HAGEN.

By A. R. Grote.

1. In answer to Dr. Hagen I will state that our copy of Hubner's Exotic Schm. was bought by Dr. Herrich-Schaeffer who, I understand, had the sale of the work. It is in three volumes. Each volume has a little page upon which alone the name of Hubner stands. If Geyer issued any of the plates there is no evidence of it. The date on the title page is 1806, 1824, therefore, I quoted it. There is no description of the species, only some printed pages of names, as I recollect. Each butterfly or moth is figured in two positions, or male and female. This work is quoted for species by every lepidopterist I ever read. It

is the most magnificent of early iconographs; Boisduval praises it as the finest illustrated work on the sublect. Until I know that it is discarded as worthless for synonymy I shall quote it; I shall even quote it in lists as long as I live. The figures are superb, easy to recognize, much better than Dr. Harris' descriptions. Hubner does not give us S. *maculata* as *caroiina*, but recognizes it as distinct under the name of *Celeus*, which I should keep, but S. *maculata* is credited to Haworth and his work is said to be earlier. I have not seen it.

As to the date of *Amyntor*, I supposed (I have not the work now, it is in the Buffalo Society Library) I quoted the the right volume for it; if by any slip I have placed 'II' for 'III,' it might occur in proofs or by my own inadvertence. It is at any rate older than *Quadricornis*. Dr. Hagen is not 'sure;' and this seems to be his state of mind on several lepidopterological matters. The mistake of the number of the volume is not as great as Dr. Hagen's incorrect date of Ochsenheimer (see preface to second part of Check List, 1886). But my memory is that the figure in our copy is next to *Chersis*, which Dr. Hagen acknowledges is rightly given as Vol. II. Dr. Harris did not know Hubner's works and described ail his species. Hubner is very exact and makes no mistakes, even in our North American Arctias.

With our copy Dr. Herrich-Schaeffer gave some memoranda of dates, from which I took the following note, printed in the Transactions of the American Philosophical Society, 1874, Nov. "The plate of this species (*Luna*), Band 2, Exot. Schm., is wrongly dated "1806" by Dr. Packard. It is later than the "Verzeichniss." In a letter dated September 29, 1866, Dr. Herrich-Schaeffer gave the following dates to [certain plates of] the third volume of the Sammlung; "*Cæsiphone* to *huntera*, 1828; *Asclepias* to *rustica*, 1829; *Io* to *taygete*, 1830; *pasithoe*, *grimmia*, 1831; *crista* to *beltras*, 1832; *nese* to *thirza*, 1833; *debora-hylas*, 1834; *lusca-huebneri*, 1835." I have not the memo. now, but as I recollect this date is the latest for any plates of Hubner's Exot. Samml. I have already printed the statement that Dr. Harris referred *Epimenis* to the genus *Brepha*, in pencil, in his extras of his paper in Silliman's Journal, which is thus later than any plates of Hubner. To speak of Hubner's work, as Dr. Hagen has done, it must first be shown that it has been rejected and the species re-named by unanimous consent. The contrary seems to be the case. This is the first I hear that Hubner's species in his beautiful and costly work are to be rejected. But Hubner's European work, as I remember, has not much text. Yet all lepidopterists in Europe adopt his names. To put Dr. Hagen's *ipse dixit* into force would oblige a change in the synonymy too great to contemplate without a shudder and not worth while to save two names of Dr. Harris's. It amounts, practically, to ruling Hubner out altogether, for, though we might keep some of the names, other authors would have to be cited.

CONCLUSION OF LIST OF AMERICAN APATELÆ.

BY A. R. GROTE.

Genus APATELA. Hubn.

Sub-genus *Megacronicta*. Gr.

The type of this section is the well-known *A. Americana*, Harr., which seems to have no European analogue, strictly speaking. The section contains the largest and stoutest species, coming nearest to the section *Acronicta*.

1. A. AMERICANA, *Harris*, Ins. Inj. Veg., p. 317, "American Dagger." This is, on the whole, our stoutest species and its range is Northern; Its identification with the *Aceris* or *Hastulifera* of Abbot and Smith is probably illusory. What species Smith intended, or if more than one, can only be ascertained by breeding Georgia specimens and by a careful comparison, in all stages, with the published figures. Guneeé's *Acericola* is a name proposed (after Harris) for *Aceris* of Smith, which, in any event, is not the European spécies of that name. Caterpillar on elm, chestnut, etc.

2. A. DACTYLINA, *Gr*, Proc. Bost. Soc. N. H., XVI., 239 (1874). This species is nearly as stout as the preceding, the color is a bluer-gray, the hind wings in the male whitish, the markings are more continuous, the squamation rougher. In no event can it be a variety of the foregoing. I have seen no description of the larva. "Fingered Dagger." Seems to be Northern in its range.

3. A. INSITA, *Walk.*, C. B. M., 61. This has apparently the hind wings white in either sex. It is much whiter than either of the other two species and had some resemblance to Smith's figures of *Aceris*, but any identification of these is clearly premature under the circumstances. The larva is not known. My specimens of the moth were from Massachusetts. I have examined Walker's type. I believe this is his only valid species in the genus.

Sub-genus *Jocheaera* Hubn.

The type is the European *A. Alni.*

1. A. FUNERALIS, *G. and R.* Proc. E. S. Phil., 6. 17, pl. 4, fig. 10; Grote Check List, 1875, plate 1, fig. 1 (photo.); *Americana*, Harr., Corr., edit. Scudd., 313, pl. 3, fig. (larva).

Dr. Speyer notes the difference (Stett. Ent. Zeit., 200) between the two species in the moth stage. Lintner describes the larva of the American species which, in this stage, closely resembles the European form with its curious club-shaped body hairs, looking like Zygæna antennæ, according to Lederer. Not only is the Mss. name *Americana* preoccupied, but it is *later* in point of publication and should not have appeared at all. The larva of *Funeralis* has been taken on hickory, elm, willow and oak. A detailed comparison of it in this stage with the European *Alni* would be of great interest. Canada Eastern and Middle States. Considered by some writers our handsomest species of *Apatela*. I prefer *Quadrata* and *Lanceolaria*.

Sub-genus *Merolonche*. Gr., c. f., Ill. Ess.

The type is the Californian *A. Spinea*, and this section, characterized by the peculiarly sunken head and bombyciform appearance, is apparently unrepresented either in the East or in Europe.

1. A. SPINEA, *Gr.*, Bull. B. S. N. S., 3, with photo. figure. "Spiny Dagger." The egg and young larva of this Californian species are described by Mr. Henry Edwards in his valuable notes on Pacific Coast Lepidoptera, but the food plant is not stated.

2. A. LUPINI, *Behr. Mss.*, Grote, Bull. B. S. N. S., 1, 79. This is a darker species than *Spinea*, the head slightly less retracted; the markings differ in detail. California. "Lupin Dagger." I have seen no description of the larva. I have used for this species a manuscript name attached to my specimens. Neither before or since has it been described by Dr. Behr, so far as I know. As with *Luteicoma*, I suppose the authority describing the moth, first, should be alone cited; so far as I can find, this is the view taken by the majority. In future the moth should be called *Lupini*, Gr.

Sub-genus *Lepitoreuma*, Gr.

The type is *A. Hamamelis*, and this group is characterized by the somewhat ovate wings, with slender, short bodies, and raised scales on the wings.

1. A. OVATA, *Gr.*, Bull. B. S. N. S., 1, 80, Pl. 2, fig. 14. "Oval Dagger." The larva is unknown to me; the species is not common in New York and Massachusetts. It looks like *Clarescens*, which, I think, belongs to another group.

2. A. EXILIS, *Gr.* A small species which I believe is best placed here and next to *Ovata*. Larva unknown. New York to Texas.

3. A. HAMAMELIS, *Guen.*, Noct. 1, 52. Guenée describes the larva on Hazel, but the species has been reared by Coquillett and others on various shrubs and trees. The moth is common and very variable. "Hazel Dagger." Canada to Alabama and Texas. My kind friend, L. W. Goodell, gives a clear description of the larva, on chestnut, *Can. Ent.*, ix., 61.

4. A. HÆSITATA, *Gr.* This is founded upon large, smoothly mixed gray specimens, which may only be a variety of the preceding, but are easily picked out. It is at least a good variety and it must be bred to decide. Pennsylvania. I have seen several specimens since describing it.

5. A INCRETA, *Morr.*

Looks very much like a small *Hamamelis*, but is, I feel pretty confident, distinct. Massachusetts and New York. The larva is unknown.

6. A. DISSECTA, *G. and R.*, Tr., Tr. Am. Ent., S. C., 178, Pl.

1, fig. 81. "Frail Dagger." This is the flimsiest of our *Apatelœ*, and might almost be taken for a *Microscœlia*. The markings are like the preceding, but the color is more plainly of an obscure gray. The moth is taken from Canada to Middle Statess, and Mr. Thaxter has discovered the larva.

Sub-genus *Arctomyscis*, Hubn.

The type is the European *Euphrasiœ*. We have, apparently, one species in North America belonging to this group.

1. A. SPERATA, *Gr.*, Bull. B. S. N. S., 1, 81, Pl. 2, fig. 1. The hind wings are white in the male sex. The markings are distinct and neat. The larva is not known. Eastern and Middle States.

Sub-genus *Mastiphanes*, Gr.

The type is *A. Xyliniformis*, and the species are intermediate in shape of wing between the foregoing and *Euloncke Oblinita*. I refer to this section 1, XYLINIFORMIS, *Guen.* 2. PALLIDICOMA, *Gr.* (I have seen this wrongly labelled "*Spinigera*," which belongs in reality to *Semaphora*, and must be a stronger marked insect.) 3. EXTRICATA, Gr. (A large Texan species mistaken for *Xyliniformis* by Belfrage.) 4. EDOLATA, *Gr.* 5. LITHOSPILA, *Gr.* Except No. 2, the species are easily known and generally correctly named in all collections which I have seen. No. 5 looks like a species of *Lithophane* at first sight.

1. A. OBLINITA, *A. and S.* Mr. Thaxter obtained specimens of this moth in Florida, which were, perhaps, larger and paler, but afforded me no ground for describing our Northern specimens as distinct. The larva is said not to agree, but we must be prepared for variation and even dimorphism in this stage. I think that over so wide a territory there will be some slight variation, and that there is no evidence we have more than one species. Canada to the Gulf.

2. A. LANCEOLARIA, *Gr.*, Proc. Acad. n. s. Phil., 418, 1875. This species is figured in my Illustrated Essay, the abdomen being too darkly colored, as I forgot to tell the artist the specimen was somewhat "greasy." The forewings were more pointed, the outer median line continuous and angulate compared with *Oblinita*. On the white secondaries there are no discal marks beneath. This is a very distinct species, and, to me, one of the most interesting. "Pointed Dagger." June. Collected by Mr. Thaxter. I have seen several specimens from Massachusetts. The larva, which I would like to know, has not yet been observed.

3. A. INSOLITA, *Gr.*, Bull. B. S. N. S., 1, 82. I have only seen the type. By the shape of the wings and white secondaries it belongs here. Fore wings almost black, with the outer median line written in broad gray lunules. It is a very distinct looking species, but it must be a great rarity. It seems impossible that it could be a variety of either of the foregoing, as it differs very clearly in color and marking. "Rare Dagger." My type was

taken about Philadelphia. The limits of the genus are clearly reached, if not overstepped, with the present section.

Sub-genus APATELA, Hubn.

There now remain a goodly number of species which, perhaps, fall into unnamed sections of the genus, and may, for the most part, be arranged between the group *Megacronycta* and *Lepitoreuma* m. The best marked of these sections is that of which the European *Auricoma* may be considered typical, and to which the term *Apatela* must be specially applied. According to Dr. Speyer's instructive article, the N. Am. *Brumosa* is related to the European *Auricoma*. Guenee does not so regard it, but finds in *Rubricoma*, Guen. and *Luteicoma*, Guen., MSS., species which he found to resemble the European *Auricoma* in their immature stages. I, myself, cannot now compare all these species, but it seems difficult to further divide the American forms into different sections or sub-genera. The larvæ of but few, however, are known, and it is upon the peculiarities of clothing in the larval stage that I would chiefly rely in limiting the sub-genera of *Apatela*. As to this latter term I have fully shown that it must be retained for the genus on grounds of priority. I follow Stephens in this. The term is significant of the curious larval structure in this group which we must call *Bombycoidæ* of Boisduval, and not *Acronyctadæ* of Harris. The best name for the sub-family group, of which the genus *Apatela* is typical, is certainly APATELINÆ. The Dasychiriform or Arctiiform larvæ are of great interest and help to bridge over the gulf between the two great families of *Bombycidæ* and *Noctuidæ*.

On the one side the sub-genus *Apatela* resembles *Semaphora* or *Triaena* (the more significant title); on another they seem to run into *Lepitoreuma*. I would add the following to my list of Triaenæ (Papilio, 3, 67):

14. A. QUADRATA, Gr. Bull, B. S. N. S., 2, 154. This, with the next following, is among our finest Apatelæ. It is a stout, rather short and wide-winged species, very distinctly marked, the black dashes squared and cut off. "Square Dagger." The species has been raised by Mr. Dodge from the larvæ. Missouri and the Western States.

13. A. RADCLIFFEI, Harvey. The exact position of this fine insect, which has the primaries of a peculiar pearly gray, and the hind wings whitish in the male, is doubtful. It seems allied to the species I have described from Texas under the name of *Tota*. The larva is not known, and perhaps this and the next are better placed in the section *Acronicta*. Eastern and Middle States. "Radcliffe's Dagger."

16. A. INNOTATA, Guen., Noct. 1, 50. *Graefii*, Gr., Proc. E. S., Phil. 2, 68, pl. 3, fig. 6. This species varies in color, some specimens being of a clearer, light fawn-yellow, others more grey and clouded. It is curious to see how the lines copy the course

in *Diphthera Fallax*. A highly colored *Innotata* does not look unlike a *Fallax* which has lost its green color and turned yellow. "Graef's Dagger." The larva is apparently not described; it will be curious to note its relation to that of D. Fallax. Canada to Middle States; rare about Brooklyn, in the then suburbs of which the type of my *Graefii* was taken rather more than twenty years ago. I venture to keep the name in the English equivalent. We used to consider this a very rare and interesting insect.

I will now enumerate the species referable to the typical group of the genus "*Apatela*" in a restricted sense, a group which is represented in Europe by *A. Auricoma*, and in North America by *A. Brumosa* more especially, as held by Speyer, though Guenee disagrees. I think that the species clustering about *A. Separans* may afford another division, and by no means consider the group as homogenous. We must know the immature stages before deciding. In *Triaena* itself, which is a more easily defined group, I am uncertain whether *Occidentalis*, *Lobeliæ*, *Hasta*, *Quadrata*, etc., should not be separated from *Albarufa*, *Falcula*, etc., to say nothing of single species of difficult affinities, such as *Vinnula*. The species of *Apatela* proper are: 1. BRUMOSA, Guen., 2; DISTANS, Gr., 3; RUBRICOMA, Guen., 4; LUTEICOMA, Guen., Mss. (this name was given us by Mr. Guenée with that of *Agrotis Repentis*, names not published in the Species General, but attached subsequently to types in M. Guenée's collection, and under which we illustrated the species—there were three such names given us by M. Guenée to my collection, but the third I no longer remember); 5, SUBOCHREA, Gr. (a fine insect taken about Buffalo—"Bright Dagger"—in no way related to Mr. Morrison's *Aspera*, which is a Hadenoid form, probably belonging to *Polia*); 6, CONNECTA, Gr.; 7, PERDITA, Gr.; 10, AFFLICTA, Gr.; 11, NOCTIVAGA, Gr. To these 11 may be added 12, HARVEYANA, Gr., and 13, CLARESCENS, Guen., which resemble *Triæna* in some respects and, perhaps, do not belong here. I do not know what the larvæ are like.

To recapitulate this list of our Apatelæ, and following in the main my arrangement in the new check list, the following are the approximate figures. There are about eighteen European species known;

Name of Sub-genus.	No of Species.	Name of Sub-genus.	No. of Species.
Triæna	16	*Lepitoreuma*	6
Acronicta	4	*Arctomyscis*	1
Megacronycta	3	*Mastiphanes*	5
Merolonche	2	*Eulonche*	3
Jocheæra	1		
Apatela	13	Total number of species	54

As near as may be we have three times as many species of *Apatela* in North America as in Europe. The genus is northern.

in distribution, yet in Texas and Arizona are a number of fine species. The geographical range of genera seems wider in North America where we find *Fidonia Fimetaria* in Texas, whereas in Europe the genus does not extend so far south. As in the butterflies the lower grade of Noctuidæ (*Catocalinæ*) are much more numerous in America, but there is no parallel in the Noctuidœ to the preponderance in Europe of groups of butterflies like the brown or meadow butterflies. In typical genera or leading genera we outnumber Europe from two to three times in species, *i. e.*, *Agrotis*, *Hadena*, *Catocala*, etc. We are weak in *Cucullia* (though we seem to have most of the groups), and, in the smaller geometrid-like Noctuids, such as *Thalpochares*, *Eustrotia*. Our *Plusias* are more bizarre, but on the whole less rich and fewer compared with Europe, but here the Asiatic species intrude. I think we may safely assume double the number of species in North America, as compared with Europe, in the *Noctuidœ*. Elsewhere I have objected to the including of the Labrador fauna in European catalogues and pointed out that its affinity was with the New England fauna of which it is an extension. The Arctic forms of Labrador are found in suitable elevation within the limits of the New England States. To return finally to *Apatelœ*, the following names I have not identified, and the discovery of the species intended will disturb our synonymy somewhat. I think that Guenée has been unusually brief and unsatisfactory in his descriptions in this most interesting of genera, and which affords, like *Heliophila*, one of the most fascinating studies in the sub-order.

A. Spinigera, Guen., Noct., 1, 45.
A. Telum, Guen., Noct., 1, 45.
A. Interrupta, Guen., id., 46.
A. Longa, Guen, id., 54.
A. Ulmi, Harr. Ent. Cor. 312, Pl. 3, fig. 10. (*Larva.*)
A. Pruni, Harr. Ent. Corr. 313, Pl, 4, fig. 13. (*Larva.*)
A. Salicis, Harr. Ent. Cor., 314, fig. 44. (*Larva.*)
A. Aceris, Abb. and Sm., 2, 93. (*Imago* and *larva.*)
A. Hastulifera, Abb. and Sm., 2, 92. (*Imago* and *larva.*)

Mr. Walker's synonyms are noticed in my Illustrated Essay.

If we could only make out these nine species *satisfactorily*, the nomenclature of our species might be considered to be well ascertained. Of two or three of them I have suspicions, but no sufficient certainty.

The main part of the interest in the species of *Apatela* must always lie in the collection of the larvæ. These are gaily colored and diversely ornamented, so much so that they offer generic characters, while the sober gray moths they produce are, on the whole, uniform and uninteresting in appearance. The characters of the genus are not strong; they have to take in so heavy a moth as *A. Americana*, and so slight a one as *A. Vinnula*; so compact a species as *Spinea* and so frail a one as *Dissecta.* I hope the present List will create fresh interest in the matter. As compared with its representation in Europe, the genus has taken on much new character, aud its diagnosis may need rewriting. I would not be understood as giving anything but the most superficial value to the sub-genera I have here recognized; they have been merely helps to sort and arrange the species and light up the genus a little from within, so that we can see where the main differences between European and North American *Apatelœ* lies.

MID-WINTER BUTTERFLIES.

By W. G. Wright.

A three hundred mile trip was made into Lower California this past winter, starting January 18, 1883. The expedition consisted of a botanist, a conchologist, an ichthyologist and a lepidopterist, and the report of this latter is herewith given. If one cannot expect very great results at this season of the year there will be this negative advantage, that the story will be brief.

The climate of this region is so mild, equable and dry that not one of the party took overcoat, umbrella or rubber blanket. Usually we went about without coats on. One day in particular was very hot; I think the mercury must have been up to 90°. A canvas covered wagon and a small tent sheltered the party at night. It was known to us as a barren country, and especially so, since no grass had as yet started, so, as forage is not kept there for sale, we were obliged to carry hay and grain for our teams, enough to last the entire round trip, from San Diego. Water for camp use is found at springs and wells. Wherever a spring is found, there is sure to be a Mexican family living. But these improvident people never have anything to sell, and when a stranger ventures into one of the houses his first impulse is to get out again as speedily as possible, unless, indeed, he be an insect hunter. Wood for camp fires was usually abundant. Only once did we fail to have a roaring good fire nearly all night, and water for camp purposes was never lacking but once; but as for brooks and running streams, there were none. During 200 miles of the Southern part of the trip not one running stream was found. It had, however, been a dry winter, no rains having fallen up to that time., consequently the whole interior was dry and barren. During the first few days we crossed a series of high, cold hills. One of the nights there was very cold, and a skim of ice was found in the morning; then the road led down to the coast, and soon we felt the damp, mild sea air, and found warmer weather, and a little green grass and blossoming plants, and a few butterflies, and, as we worked southward along the shore we met ever-increasing numbers of flowers and flying things, and still lovelier weather.

At one place we found an American family who had been apprised of our coming. The young lady of the rancho had found for me a few large cocoons about the size of hens' eggs. Some of them were found on the evergreen pepper tree, *Schinus molle*, others on the cultivated almond, and on southernwood, *Artemisia*. I hunted the pepper tree over again, and found one more cocoon. But what they were I shall never know, for they did not live to emerge.

Flying about a gorgeously flowering *Lantana* bush I found a few butterflies, and at dusk also a good many small moths. Here also were beds of *Mignonette* in blossom, *Nasturtium*, *Geranium*, and banana, strawberry and almond flowers, but none of them had butterflies. A few days afterward I found some half-grown larvæ on a *Pentstemon*, and also the same kind on a wild rose bush, both plants being in leaf. Some of these larvæ I brought home with me, fed them to maturity, and got *Melitaea Chalcedon*. The larvæ of this butterfly must hybernate when half grown On the sandy beach, and just above high tide were composite plants in blossom and there I took several butterflies. Near by and sheltered from the sea by sand dunes, I found a series of *Lycœnas* on the salt grass, especially *L. Exilis*.

One day we went to explore a warm canyon that was so sheltered from the chill ocean ocean breeze as to be more forward in vegetation than any other place. Here I got several Spring *Lycœnas*, also *Lemonias Virgulti*, and *Colias Harfordi*. And on a steep, sunny slope, I found one *Charis Nemesis* on a composite flower.

Many other canyons, plains and hills, were ransacked, but the narration would be tedious. But I must not omit *Lycœna Sonorensis*. During the whole trip this delicate butterfly was seen only at one place, a dry mesa or beach, close by the shore, and shut in by some circling cliff, like hills. There, in a little potrero or basin, ond almost in the mist of the thundering surf, there were hundreds of them. As one was caught, one or more others were sure to be seen. The ground was in good part covered with impenetrable clumps of cactus, and between and among the bunches of cactus grew the plant of these little butterflies, *Erodium cicutarium*, upon which the females were depositing their eggs. I thought it rather singular that this most tender of all butterflies should be breeding at this season, and directly in the breath of the ocean.

While busily engaged in taking a supply of these beauties, I attracted the attention of three young Indian boys, ten or twelve years old, and they came down to see what I was doing. They wore no hats, no shoes, no clothing. One had a string around his waist; the second had added to his string a narrow strip of cloth between his legs and tied before and behind to the string, while the third had neither ribbon or string. Their faces were broad, coarse, and brutal; their heads large. and covered by a fearful mat of hair, while the skin of their bodies, naturally dark brown, was almost black from continual exposure. And they gazed in dumb amazement at me, as I caught the little silvery-blue gems. At length, getting the idea, they began to try to help me. They chased about nimbly among the sharp cactus spines to catch the butterflies in their hands, and really did so catch several, and offered them to me, but I refused them, and made the little rascals stop crushing the tiny things in their great paws. These boys had their bows and arrows, which they did not lay down. The bows were of oak sapling, very roughly made, and the arrows were straight splints of wood, illy pointed, not poisoned, and spirally feathered with some care, the wings being gummed to the shaft with the pitch of the pitaya cactus, and the string of the bow was home-made from fibres of the agave. One offered to sell his bows and arrows for "dos réal," (25 cents.) They called butterflies "palometer," and sphinges "mariposa." They said that their house was on the cliff, and I went up there with them to see in what state they lived. It was an open place between the larger rocks, just like a sheep pen, and all the house there was consisted in a little brush thrown in, fence-like, only that and nothing more. No roof, no shelter at all, no fire-place except three stones. And lounging about were thirty or forty adult Indian savages, playing with Spanish cards, or gambling with sticks, or dozing. From appearances, they had lived there a long time. After watching their doings for a long while, I turned to go away, and came wirhin an inch of stepping upon a squaw who was curled up in a little hole or hollow, asleep. She started up in alarm, and in silence sat and stared at me with her great black eyes, and, for all I know, she is gazing yet.

Following is a list of species observed, except the *Heterocera*, which are not yet determined:

Pieris Occidentalis,
Sisymbrii,
Anthocharis Sara,
Cethura,
Colias Harfordii,
Ariadne,
Danais Archippus,
Berenice,
Vanessa Antiopa,
Pyrameis Huntera,
Cardin,
Carye,
Junonia Cœnia,
Lemonias Virgulti,
Charis Nemesis,
Lycæna Antiacis,
Sonorensis,
Piasus,
Amyntula,
Exilis,
Phyciodes Mylittæ,
Pyrgus tesselata,
Thanaos Tristis.

Obituary.

PROF. P. C. ZELLER.

The death of this veteran lepidopterist has occurred, long expected and deeply regretted. Seven years younger than the century itself, Prof. Zeller was born on the 9th of April, 1808. Professor in the Prussian Real Schule at Meseritz, he was finally retired on a Government pension, and has lived since 1870 near Stettin, continuing his entomological labors in connection with the Entomological Society of Stettin. Commencing to write at an early age, Professor Zeller has grown up with the modern science of lepidopterology. His earliest studies were upon the collections of Frau Lienig and the material brought by himself from a Southern trip, which extended as far as Sicily. Zeller discovered the curious diurnal *Rhodocera Farinosa*, besides describing certain *Lycænidæ*, but his principal attention was given to the small moths of the families *Pyralidæ* to *Tineidæ*, the modern classification of which he may be said to have founded. He first cleared up the confusion as to the genera of *Phycidæ* and by using natural characters, chiefly secondary sexual ones, he succeeded in disentangling our minds with regard to the order of nature in this obscure and neglected field of inquiry. His species and genera are very numerous and almost always valid. It is a misfortune that his valuable monograph on the *Crambidæ* was issued so nearly simultaneously with the worthless writings of Francis Walker on the same subject, so that some of our North American material has been twice named. The evidence seems to be that Zeller's paper may have been earlier. As a matter of justice it should have priority. In a series of articles, published since retirement from official duties, Prof. Zeller described a number of moths from North America. Rather more than the, unfortunately not to be avoided, proportion of synonyms mark the papers, which are otherwise models of what descriptional work ought to be. Still later, Professor Zeller has published a beautifully illustrated volume on microlepidoptera and has given a classification of *Chilo*. As I remember him, in 1867, Prof. Zeller was a white-haired gentleman of very kind manners and enthusiastic for his favorite science. He was moderately thin and tall, wearing a slight whisker, but otherwise with clean shaven mouth and face. His nose was large and well-shapen, his eyes bright and the whole expression of his face pleasing. He had high cheek bones and his countenance was unmistakably German in its salient features. Loew, the celebrated dipterist, was then living in Meseritz, and an entomological excursion which I made with these two celebrities is among the most pleasant of my

European reminiscences. Prof. Zeller's home relations were of the happiest, and the sympathy of an amiable and considerate wife was his through life. And it was a life devoted to science and learning. His accomplishments as a linguist and teacher were well known and appreciated in Germany. We know him chiefly as a biologist, the describer of the exterior structure of lepidoptera. He was fortunate enough to avoid much of the controversial spirit which accompanies descriptive entomology. Although he felt deeply the uselessness of the British Museum Lists and his own studies were impeded thereby, he has, on the whole, little to say in criticism of others. He was not only charitable, but had schooled all natural irritability. His assistance was freely given to others, and Mr. Stainton's work on the Tineina acknowleges its value. He was a type of a kindly German pedagogue and naturalist which hardly exists elsewhere. A. R. G.

BOOK NOTICES.

AN EXCELLENT BOOK.

We have received from the publishers, Messrs J. B. Lippincott & Co., of Philadelphia, a beautifully printed volume of 436 pages, illustrated with 440 wood cuts, entitled "Insects Injurious to Fruits," by William Saunders, the well known editor of the *Canadian Entomologist*. A careful entomologist, an experienced agriculturist, an able chemist, Mr. Saunders unites the qualities necessary to produce a valuable work on Economic Entomology and, in fact, the volume before us is, without any doubt, the most able contribution to a knowlegde of its subject in the English language. We say this with an acquaintance of what has been published both in England and America upon this subject. In addition to its practical and scientific value, which should recommend it to every orchardist and entomologist in America, it is written in a particularly clear and unaffected manner, so that the information it contains is readily assimilated by the reader. The illustrations are superior to anything yet published in this style. While many of these have appeared in Government or State Reports, many are original and these are better than any we have yet seen. Take, for instance, fig. 173 (*Apatela*) or fig. 208 (*Dynastes*), these figures seem the perfeetion of drawing. The arrangement of the contents is very convenient. The different fruit trees and plants are treated in turn with the species injurious to each and the remedies following. Sixty-four numbers alone are given to the apple, which attracts so many injurious insects that an old apple orchard is a place of infection for a wide district. There is a good index and a list of the scientific names used, at the end of the book, which is an important matter to a work of this kind and, in saying that Mr. Saunders has ably performed a tedious but much needed task, we feel that we are simply just without being at all generous. Considering the quantity and quality of this class of work it may be thought difficult to produce a striking addition to our literature of the subject, but Mr. Saunders has succeeded in doing this and since the publication of the late Dr. Harris's Treatise on Insects Injurious to Vegetation. which has become a classic, nothing has appeared so useful and readable, so free from objectionable and useless matter, in such equally good taste as Mr. Saunders' volume on Insects Injurious to Fruit The book will find its way, undoubtedly, into many hands and will add to the solid esteem in which its author is held by all who have benefited by his scientific labors or his personal friendship. Mr. Saunders' book is like himself, good, solid, sincere and useful, utterly devoid of humbug and clap-trap, deserving of the commendation of every conscientious thinker and worker the world over. A. R. GROTE.

A NEW PRINCIPLE IN PROTECTION FROM INSECT ATTACK.

Under this caption Prof. J. A. Lintner claims originality for the idea that by deodorizing plants they will be saved from being the depositories of the eggs of insects. The pamphlet is nicely written, but contains no details of experiments to justify the author's claim, the originality of which seems unimportant in the face of the fact that practically that is what is effected by the use of many remedies against injurious insects. The pamphlet is occupied by an *ex parte* argument as to the sense of smell in insects, of which no one has publicly, we think, denied the existence. It is certainly not to sight that moths owe the finding of plants in the darkness on which to oviposit. What is needed in the use of preventatives just now is *systematic action* and *co-operation.* The labor of one farmer is neutralized by the idleness of his neighbor and injurious insects are harbored next door to where they are constantly being driven out. The remedy is the education of the rising generation. If, in the common schools throughout the country districts, practical entomology were taught in a simple elementary manner we should soon see a different state of affairs, then the young farmers would probably take the nests of the apple tree tent caterpillar in time, instead of those of the robin, and we should have more birds and less noxious insects. Professor Lintner's pamphlet is an addition to the theoretical discussion of Economic Entomology and will no doubt be read with interest in certain quarters. A. R. GROTE.

NOTES ON LEPIDOPTERA.

Melitæa Chalcedon is the largest of its genius in California, ranging from 1½ to 2⅜ inches in expanse. It is rather variable in its markings, especially on the primaries, where the spots vary from white to yellow, and run into each other and. play at hide and seek with the red ones; but it is always very gay and handsome in its coat of black and red and yellow. Occasionally, also, marked cases of suffusion are found, where the fore wings are wholly suffused with a beautiful crimson, which obliterates the light markings. The eggs are light yellow, nearly globular, and very small, considering the size of the butterfly. They are carelessly laid on the upper or under side of the leaves, indifferently. In confinement they are as freely deposited on the gauze bag as upon the plant, The larvæ are spiny and woolly; rather restless in habit, moving about a good deal, and are free feeders, eating various scrophulaceous plants, also a wild rose, but are oftenest found on *Scrophularia Californica*, a perennial herb, and on *Pentstemon antirrhinoides*, a deciduous bush. In Mexico I have found the larvæ feeding in January. but in California they do not appear till April, and the butterfly is on the wing early in May. W. G. Wright.

Hadenella. n. g. Small, allied in form to *Oncocnemis Gracillima*. Front with a central navel-shaped or sub-cordate tubercle. Labial palpi short; third joint very small, hardly exceeding the infra-clypeal plate. Tongue moderate. Eyes naked, unlashed. Tibiæ unarmed. Abdomen smooth, a minute tuft at base. Vestiture scaly. Thorax thickly squamous behind. Antennæ simple.

Hadenella Pergentilis. n. s. Resembles *Hadena Cylindrica*. Gray, shaded with fawn or ochrey. Orbicular oblique, pale ringed, with dark center. Reniform transverse, blackish. Claviform indicated, like orbicular. Lines obsolete. A black costal mark before the fawn-colored apical region. Terminal space with a rufous central shade, marked with blackish at internal angle. Veins dotted. Fringes gray and pale, lined at base. Hind wings pale fuscous. Washington Territory. At Mr. Neumœgen's request, I described this little species before giving him the *Noctuidæ* of my late collections.—A. R. Grote.

Hibernating Butterflies. The spring has been very backward, judging from the condition of vegetation. To-day (May 8) I noticed a comparatively fresh specimen of the Camberwell Beauty, certainly a hibernated example, on the flowers of the Kentucky currant. I have observed this butterfly (*Vanessa Antiopa*) hibernating on Staten Island many years. Wintered examples have the veins denuded on the brown field of the wings. A. R. Grote.

Grapta and Calephelis. I have shown that there was a botanical genus *Polygonum* when Hubner described *Polygonia* and that, therefore, Kirby's term *Grapta* should be retained for the lepidopterous genus. As to the Erycinid genus *Calephelis*, this is not a pseudogenus, based on illusory comparative characters, as are many of Mr. Scudder's, but *Borealis* and *Caenis* differ from *Nymphidia* by the hairy eyes. *Callicista*, Gr., is one of these bastard genera, which have only a sectional signification if we base, as we must, our genera upon natural characters. A. R. Grote.

Thecla Læta. In the woods, near my house, to-day I took a ♀ *T. læta*, the second example I have taken here in eighteen years. *Lyc. violacea* was abundant. W. H. Edwards, Coalburgh, April 17, 1883.

Curious Variety of Telea Polyphemus. On the 16th of June I captured at Fort Lee, on the Hudson, a very singular specimen of this insect, which deserves a permanent record. It was wholly of a pale ochreous tint, smaller than the usual size, and with no appearance whatever of the transparent vitreous spots, so characteristic of the species. The bluish lunules of the secondaries are much narrower than usual, and the yellow spot which generally encloses the transparent space is reduced to a small ovate opaque patch. The specimen is a male, and was at rest on an oak tree, having just emerged from the chrysalis. Carrie M. Edwards, New York, June 25, 1883.

WHILE these sheets are passing through the press, we have, with infinite sorrow, to record the death of our friend and fellow worker, Dr. JAS. S. BAILEY, of Albany, which took place on the 1st of July. A memoir of his life and writings will appear in the September number of this journal.

PAPILIO.

Organ of the New York Entomological Club.

Vol. III.] SEPT.—DEC., 1883. [No. 7-10.

ON THE TRANSFORMATIONS OF SOME SPECIES OF LEPIDOPTERA.

By HENRY EDWARDS and S. LOWELL ELLIOT.

It is desired in the present paper to give some few facts with reference to the early stages of well known insects, and to call attention to the food plants of many not hitherto recorded. It is hoped that, while following a beaten track in many instances, some new ground may yet be covered, and that the record of observation now given may not be without its value. The numbers following the name refer to the species in Mr. Elliot's breeding boxes.

SPHINGIDÆ.

HEMARIS UNIFORMIS. G. and R. (No. 51.)

Larva. (After 3d moult.)

Head rather small, bluish green, with white irrorations; 2d segment with yellow ring in front. The dorsal region is greenish white with darker median stripe. Below this is a lateral yellow line running to the caudal horn, and becoming wider as it approaches its base. The lateral space below this line is yellowish green, covered with yellow irrorations. The spiracles are red in the centre, with a white dot above and below. On the anal segment is an oblique yellow dash. The abdominal legs are yellowish at their base, banded with black, and with the tips pink. The thoracic feet are black at the base, then a narrow white band, and pink at their tips. Mouth parts black. Caudal horn rough, pinkish on the sides, blue green in centre and beneath, with raised black irrorations.

Length, 1.50 inch.

Food plants. *Viburnum opulus* and *V. dentatum.*

Larva (Full grown.)

The dorsal line after the last moult has become a crimson broken band, edged and shaded with white. The blotches around the spiracles are more distinct—the spiracles themselves are black in the centre, with a clear white spot above and below. The underside has a crimson line along the anterior and posterior portion, and sometimes a crimson transverse line in the middle between the abdom. legs and thoracic feet.

Pupa. Pitchy brown, elongate, head parts much produced, and flattened about the wing cases. The segments are roughened on the anterior, rather smooth on the posterior portion. Cremaster rough, thick, and long.

Length, 1.50 inch.

Two specimens of the larva have the 2d segment somewhat raised, roughened, with small tubercles, reddish orange. The spiracles are bright crimson, surrounded with a crimson ring or blotch. Caudal horn also crimson.

DARAPSA CHOERILUS. *Cram.* (No. 70.)

Larva. (Full grown.)

Head very small, as in all the genus, pale yellow green, with darker median line; 2d segment, yellow green, with numerous irrorations. The spiracles in this segment are all orange in centre, pale yellow above and below. In the other segments they are orange, white above and below. Segments 3, 4, and 5 are also pale yellow green—the two latter swollen into a hump. The remaining segments are all bluish green, covered with white dots, and with a slightly darker dorsal line. On 5, 6, 7 and 8 are oblique whitish bands; but on the posterior segments these are lost in a continuous line to the base of the caudal horn, which is bluish at the base, pale green at the tip, and white in the centre. The anal segment is yellow green, as also are the abdominal legs. The thoracic feet are green, with the sides orange red.

Previous to change, the caterpillar assumes a purplish leaden hue, the dorsal and lateral lines becoming blackish.

One specimen is pinkish, with the 4 anterior and the anal segment of a brownish cast, and with a dark dorsal stripe. The lateral line is also brown.

The differences between *D. Myron* and *D. Choerilus* are that in the former the whitish oblique stripes are interrupted by the lateral line, which forms a straight edge at the junction of the oblique lines. There is also a distinct white lateral line along the anterior segments, 2, 3, 4, and 5, which is wholly wanting in *D. Choerilus*. *D. Myron* has also a row of sub-ovate dorsal spots on the anterior portion of each segment. The color of *D. Myron* varies exceedingly, green, cream-color, purplish brown, deep brown and lead color being found.

Food plants. *Viburnum opulus*. *V. dentatum*.

Pupa. Purplish brown, with pink tint over the whole surface, slightly mottled. Wing cases also mottled with black. Spaces between the segments pitchy brown. Spiracles large, well marked, deep brown.

CRESSONIA JUGLANDIS. A. & S. (No. 50.)

Young Larva.

Very pale yellowish green, the body entirely covered with pale yellow irrorations, regularly placed, about 5 rows to each annulus. Head truncate in front, conical, the apex of the cone being furnished with 2 chestnut brown roughish spinous processes, from which along the sides of the head, arise 2 narrow yellowish streaks. The lateral streaks are narrow and very indistinct. The caudal horn is rough, pinkish at the base, with some very minute black points upon the surface.

On hickory. (*Carya alba L.*)

SPHINX CHERSIS. *Hubn.* (No. 42.)

Larva. (Full grown.)

Pale blue green, whiter on the dorsum. Head and 3 following segments of a darker tint. The head, which is rather small for the size of the larva, has 2 oblique yellowish white stripes in front. The usual oblique stripes of the body are clear white, edged in front with a blue green shade. They are rather broad. The anal segment is truncate, wholly yellowish green. Caudal horn bluish, black at the extreme tip. Spiracles black in centre, with a white circle. Feet and mouth parts pinkish brown.

Abdominal legs, blue green.

Length, 3.75 inch.

Food plant. *Syringa persica.*

BOMBYCIDÆ.

PHRAGMATOBIA RUBRICOSA *Harr.* (No. 18.)

Larva. (Full grown.)

Head moderate jet black, shining. Body slate color, with pale yellowish dorsal and lateral lines, the space between them being closely covered with black waved lines, formed of transverse specks. The spiracles are clear white, with black ring, and below them is a broad waved yellowish line. Each segment is furnished with 8 tubercles, from which spring bunches of bright chestnut spines. Under side slate color. Feet black. Abdominal legs pale testaceous. Some examples have the ground color a little darker, with the spines much lighter in shade. This may be a sexual character.

Length, 1.30 inch.

Cocoon. Very thin, and lace-like, oval, and very regular in outline, attached to the under side of the leaf. Clearly shows the pupa within.

Pupa. Short, pitchy black, shining, slightly constricted at the base of the wing covers, and swollen at the middle of the abdomen. The segments beneath are paler posteriorly. Anal segment chestnut in the centre.

Length, 0.75 inch.

The caterpillar when disturbed falls to the ground, concealing itself at the base of its food plant, and the moth has much of the same habit, feigning death and hiding in the grass and other herbage. The food plants, so far as observed, are *Solidago*, *Eupatorium*, and *Symplocarpus* (Skunk cabbage.)

DEIOPEIA BELLA. L.

Larva. (Full grown.)

Head chestnut brown, smooth, shining. Ground color of body deep buff, without orange tint. Each segment has a black transverse mark deeply notched before and behind, and edged broadly with white, bearing rather long hairs, those of the dorsal region black, of the lateral white. The mouth parts are white. The abdominal legs orange, banded with black and white. The thoracic legs wholly black.

Length, 30 mm.

Food plants, *Prunus*, *Lespedeza*, *Ulmus*, *Myrica*, as well as the pods of *Crotalaria*.

PARASA CHLORIS. H. S. (No. 56.)

Larva. (Full grown.)

Dorsal region white, with 3 stripes of bright purple, slightly waved and contracted at base by the large conical processes, 6 of which (3 on each side) spring from the sides of the dorsum, which are elevated into a sharp ridge. The color of these processes is bright orange red, and they are covered with rather long yellow hairs. The spaces between them are also orange red, and bear two smaller tubercles with yellow spines. Below these is a double row of purple lines, enclosing a series of small orange red tubercles, and on the lower lateral region is another row of spinous tubercles of the same color. The under side is wholly dull purplish brown.

Length, 0.90 inch; width, 0.30 inch.

Food plants, wild cherry, *Myrica*, *Ulmus*, etc.

LIMACODES SCAPHA. *Harris.* (No. 53.)

Larva. (Full grown.)

Ground color pale apple green. The segments are extended laterally in the middle of the body, and raised into an elevated ridge, sharp and angular at the edges. The flattened portion which includes the dorsal region is chestnut brown, darker on the margins. There is also a darker dorsal stripe. The segments are arranged like the plates of a tortoise. The lateral region is a pale yellowish green, with oval white spot on 9 and 10 segment. Spiracles pale brown; mouth parts also brown. In some specimens the brown color of the dorsum is reduced to small patches, and occasionally a yellow dorsal line is present, the ground color (pale green) then prevailing.

Length, 0.85 inch; width, 0.25 inch.

Food plant. Wild cherry.

Before undergoing its change to *pupa*, the caterpillar becomes creamy white, and loses the brown marks of the dorsum. The underside of the body is more yellow, and the green color only faintly retained about the head and the 2nd segment.

ADONETA SPINULOIDES. H. S. (No. 67.)

Larva. (Full grown.)

Whole lateral region bright apple green. The dorsal is chestnut brown, narrow on 2d segment, widened on 3d, and still wider on 4, 5, and 6. The 7th is yellowish green, thus breaking the line of the chestnut color. On 8 the brown markings again widen out, extending over 9, and narrowing on 10 and 11. On the sides of the dorsum is a row of orange red tubercles—11 on each side—bearing very short spines, those of the posterior segments being the largest. There is also a series of non-spinous tubercles above the spiracles.

Length, 0.40 inch.

Food plant. Wild cherry.

GLUPHISIA TRILINEATA. *Pack.* (No. 41.)

Larva. (Full grown.)

Very bright apple green. Head of a bluer shade, with 2 minute black dots at the junction of the 2d segment. On the dorsum for the whole length of the body are two rather broad, even, yellow stripes. Spiracles very minute; whitish green.

Length, 0.65 inch.

On willows.

NOTODONTA STRAGULA. *Gr.* (No. 85.)

Larva. (Full grown.)

Head slate color, mottled with black, and with pale stripe on each side. Mouth parts with a greenish tinge. Body pale lilac, with the exception of the 11th and 12th segments, which are dull golden. The 7th and 8th have raised prominences, which are also golden, that of the 7th being the largest. Laterally there are some pale oblique streaks somewhat similar to those of many *sphingidæ*. These do not meet on the dorsum, where there is a faint slate-colored line. Between the 2d and 6th segments, and common to all of these, is a darker dorsal shade which re-appears on the 11th and 12th. The spiracles are white, with a black ring, and the lower lateral line is paler than the rest of the body. The 12th segment bears a hump, and the sides of 11, 12, and 13 are pale brown, mottled with orange. Abdominal legs dull slate-color, mottled with black; thoracic legs black.

Length, 55 mm.

Food plant. Willows.

OEDEMASIA CONCINNA. A. & S. (No. 47.)

Larva. (After 2d moult.)

Body bright yellow; head jet black; 2d segment with a jet black transverse mark. Each of the other segments has a transverse row of 8 or 10 minute black points, those of the dorsal region being the largest. Between these are a few whitish hairs. Anal segment and thoracic feet pitchy; abdominal legs concolorous.

(Full grown.)

Head coral red, as is also the 4th segment, which is raised into a hump. The dorsal and anal regions are a dull yellow, with black waved lines; the sub-dorsal white, with waved black lines. Lower lateral yellow, with waved black lines. All the segments bear 6 or 8 piliferous black tubercles, looking like black sealing wax. Anal segment jet black. The hairs are all sordid white. Underside dull yellow, streaked with black waved lines. Abdominal legs yellowish flesh color. Thoracic feet black.

Length, 30 mm.

Food plant. Willows.

CERURA CINEREA. *Walk.* (No. 52.)

Larva. (Full grown.)

Pale apple-green; head brown; 2d and 3d segment also with brown triangular patch, not united to the brown dorsal patch. On the 2d segment are two raised rough processes, like horns, brown in color. Commencing on the 4th, and continuing to the anal segment, is a brown patch, as in other members of the genus—a mere point on 4, spreading out diagonally on 6 and 7, narrowing on 8, a little wider on 9, narrowing again on 10, and wider on 11 and 12. The anal segment is furnished with long filaments alternately brown and green. The lateral green spaces have a number of rather small reddish spots, and on the dorsal brown patch are some small roughened tubercles.

Length, 1.30 inch.

Food plant. Willows.

The younger stages are of a paler color in all parts, without any perceptible difference in the markings.

TOLYPE VELLEDA. *Stoll.* (No. 37.)

Larva. (Full grown.)

Body dull rusty black; the head rather smaller than the 2d segment, and streaked longitudinally with sordid white. The sides of the segments are produced into a long, blunt tubercle, from which spring out like a fan a series of very long hairs, some of which are ciliate, others with a fan-like termination All the segments dorsally have 2 spinose tubercles, those of the third segment being very much larger than the others. On the sides of 4 is a broken whitish patch; on 8, another, which spreads over the dorsum; and on 11 and 12 others less distinct. The underside of the body, including the legs, is reddish flesh-color, with a velvety black spot between the legs. At the juncture of 4 and 5 is a fold, velvety black beneath, only visible when the *larva* is in motion.

Length, 2.00 inch.

Food plant. *Prunus*, *Populus* and *Syringa.* sp.

TOLYPE LARICIS. *Fitch.* (No. 38.)

Larva. (After 3d moult.)

Entire surface rusty brown, the segments are corrugated in large folds, each bearing dorsally transverse tubercles, those of the 4th and 9th being the largest. The lateral ciliæ are attached to tubercles as in *I. velleda*, but are much shorter than in that species.

(After 4th moult.)

Rusty brown, paler than *I. velleda*, with the segmental tubercles similar in shape, but much smaller, and with the white blotches less distinct.

On *Larix Americana.* Michx., and other sp. of *coniferæ.*

NOCTUIDÆ.

ACRONYCTA GRISEA. Walk. (No. 97.)

Larva. (After 3rd moult).

Pale apple green, the dorsal region elevated into a ridge and marked with a broken brown dorsal line, broadest on 2, 3,8, 9 and 10; the brown patch on 2 has its edges cream color: head pale green in centre, brownish on the sides, with paler marblings; 3, 4, 5, 6, 7 and 12 have small raised tubercles, bearing spines, and 2 bears bunches of long hairs. Lateral region wholly pale green, with whitish irrorations. Spiracles cream color, edged with black. Feet and legs concolorous.

Length, 15 mm.; width, 3 mm.

Larva. (Full grown.)

Head dull chestnut brown, with some darker markings; body wholly yellowish green, with slight brownish tint. On 7 and 8 is a broad brown triangular patch, the mark being continued slightly reducing in size to the anal segment. Each of the segments bears brownish tubercles, with short spinous hairs; those of No. 5 have 6 tubercles, of 8 and 9 three each, and the rest only 2; there is a faint sub-dorsal brownish line broken up into patches; the spiracles are brown, with redder brown patches above and below them. When at rest, segments 3, 4, 5 and 6 are very much elevated into a hump. All the tubercles bear short sharp hairs, and there is also a series along the lower lateral region.

Length, when at rest, 25 mm.; when feeding, 32 mm.

Food plant, *Ulmus.*

A variety of the caterpillar occurs, which is pale brownish, with a flesh tint, but agreeing in all its markings with the green form.

Food plant, *Viburnum.*

On changing to pupa, the larva loses the brown patches of the middle and posterior segments, and becomes wholly of a dull orange color.

ACRONYCTA OCCIDENTALIS. G. & R. (No. 46.)

Larva. (After third moult.)

Body wholly velvety black, as are also the head, legs, and entire under surface. Each segment is furnished with 7 small warty tubercles, from which spring bundles of short ochreous spines. The spiracles are white, and below them is a waved irregular line of pale reddish brown.

Length, 1.00 inch.

Full grown. Head pitchy, with deep sinus in the middle. Along the dorsum is a broad black band, extending on each side, in the middle of the segments, into a transverse line, on 5 to 10 only. This band bears on each of these segments 2 ochreous spots, between which are some whitish patches; the sub-dorsal lines are sordid flesh-color; those of the lateral region enclosing the spiracles are lead-color, the spiracles being black; the 2, 3 and 4 segments are wholly lead-color, only interrupted by the pinkish sub-dorsal stripe; the 12th segment bears a small hump, and the body is covered rather sparingly with long chestnut hairs.

Length, 1.25 inch.

Food plant, wild cherry.

ACRONYCTA LITHOSPILA. Gr. (No. 102.)

Larva. (Full grown.)

Very dark bluish green, darkest dorsally; head slightly truncate in front, with 2 slightly raised protuberances on the crown; pitchy with brown marks. The body is covered with rather long hairs; along the dorsum is a dull pink stripe, triangularly formed on the 6 anterior segments, then widening very much until the whole of the dorsum is covered on 7, 8 and 9, then narrowing again to the anal extremity. The middle and broad portion of this mark is darker than the anterior and posterior portions; the hairs spring from small pinkish tubercles, the spiracles also being of a pinkish cast; under side all dull green.

Length, 35 mm.

On hickory. (*Carya alba. L.*)

AGROTIS C-NIGRUM. L. (No. 2.)

Larva. (Full grown.)

General color, dull brown; darker anteriorly. Head small, very shining, with two black streaks in front. There is but a faint indication of a pattern upon the segments dorsally, the whole of the markings being clouded and indistinct, being a little paler posteriorly. Upon the 11th, 12th, and 13th segments, however, are two oblique black velvety streaks directed towards each other posteriorly, and giving a strong character to the otherwise faint markings. Below the spiracles, which are white edged with black, is a rugged line of pale fawn-color. The underside, including the legs, is pale testaceous.

Length, 1.15 inch.

Food plant. *Cichorium Intybus L*

May 2. Imago emerged June 4.

There are 2 broods of this species. The 1st brood appears in April. having hybernated in the larva state. The 2d appears in August, some of the hybernated individuals going over as late as this month.

MAMESTRA RENIGERA. Stph. (No. 1.)

Larva. (Full grown.)

General color, dark fawn brown; head shining, with narrow pale stripe in the centre and broader stripe at the sides. There is a pale narrow dorsal line, and on each segment, dorsally, a brown diagonal shade, on the apical points of which are small shining tubercles, each bearing a black hair. These tubercles are two to each segment. The marks of the two anal segments, instead of being diagonal, are triangular. There is a broad and decided black lateral line above the spiracles, and beneath this, enclosing the spiracles, which are black, is a waved double line of pale brown. Below this again is a pale fawn-colored corrugated fold. Underside, dull stone-drab. All the feet are black at the base.

Length. 1.00.

Food plant. *Cichorium Intybus L.*

Double-brooded; appearing in April and August.

EUPLEXIA LUCIPARA. L. (No. 79.)

Larva. (Full grown.)

Emerald green. Head, greenish testaceous; mouth parts pale pitchy. There is a very faint broken dorsal line, and a shading with a darker green over the whole of the dorsum. The junction of the segments is yellowish. Spiracles very small, whitish, with broad black ring. The lower lateral space is pale bluish green. On the top of the 12th segment, which is somewhat swollen, are 2 small spots of clear white. The underside is wholly pale bluish green.

Length, 35 mm.

Food plants. *Viburnum*, *Betula*, etc.

ACHATODES ZEÆ. Harris. (No. 18.)

Larva. (Full grown.)

Sordid white. Head and 2d segment jet black, shining, the latter occasionally white at the sides with 2 black spots. The 3rd and 4th segments have each 14 jet black shining points, 12 of which are placed transversely and somewhat irregularly, the other two in front, the lateral and sub-dorsal points being the largest. The other segments, except the anal, which is wholly black, have 12 black spots each, those of the dorsum being the largest. Feet black. Abdom. legs sordid white, with a black lunate mark at their junction with the body. Spiracles jet black.

Length, 1.00 inch.

In stems of elder (*Sambucus*) feeding upon the pith.

Pupa. Bright shining chestnut brown, the anterior portions of all the segments darker, roughened. The spiracles are also darker brown. The head is truncate in front, and furnished with two small roughened but pointed processes, which are probably used to break through the thin rind of the alder stem, as the larva feeds out a space, leaving on the outer rind a very thin portion to enable it to escape.

Length, 0.90 inch.

SCOLECOCAMPA LIBURNA. Geyer. (No. 3.)

Larva. (Full grown.)

Head and 2d segment pitchy black, very shining, bearing a few fuscous hairs. General color dull smoky, or greyish white, with a darker dorsal line. The outer integument is thin and transparent, and through it the circulation can be distinctly seen. From each of the segments spring 10 small brown tubercles, each bearing one or more fuscous hairs. These tubercles are placed laterally, the dorsal region being entirely free from them. The anal segment is pitchy, as are also the thoracic feet, the abdominal legs being concolorous with the body.

Length, 1.60 inch.

In decaying stumps of chestnut trees.

As soon as the larva is ready to transform it hollows out a small space in the ground at the base of the tree, which it covers with a thin web, and then spins a rather tough cocoon of pieces of wood, inter-mingled with its own frass. The pupa is bright reddish brown, the segments edged with a darker shade. It is long, tapering much towards the anal extremity, very shining, with the antennal cases very prominent.

LITHOPHANE LATICINEREA. Grote.

Larva. (Full grown.)

Pale bluish green, whitish posteriorly. Head bluish green, narrower than the 2d segment, with a lateral line of very minute black spots. A faint whitish dorsal line. The segments are slightly corrugated, with numerous striæ, and very minute tubercles on each. The spiracles are jet black, with a broad bright lemon-yellow band below them. Feet and legs bluish green.

Length, 1.40 inch.

Food plant. Wild cherry.

CRAMBODES TALIDIFORMIS, Gne. (No. 24a.)

Larva. (Full grown.)

Rather a dull apple green. Head narrowed in front, with some faint white marblings at the side. A broken dorsal line composed of pink spots, sometimes pale, and in a few specimens quite obsolete. Two sub-dorsal broken lines of white spots and a broad, pink lateral line inclosing the spiracles. This line is usually widened a little in the middle of each segment above the spiracle. Between all the lines are a few white spots, irregularly placed. The spiracles are black.

Length, 30 mm.

The cocoon is formed of small fragments of sand, etc., spun together by silk, and is attached to any neighboring object, such as the stems or roots of plants, about one-half of the cocoon being below the surface of the soil. It is almost globose, or but slightly oval.

INGURA PRÆPILATA Grote. (No. 100.)

Larva. (Full grown.)

Yellowish apple green. Second segment with yellow line in front. All the segments have about 15 to 18 yellow spots irregularly disposed. Most of these spots are lozenge-shaped; those of the subdorsal region being somewhat linear. Spiracles dull orange, with bright lemon-yellow stigmatal line.

Length, 16 mm.

Food plant. *Liquidamber ptyraciflua L.*

PYRRHIA EXPRIMENS. Wlk. (No. 55.)

Larva. (Full grown.)

Head, pale chestnut. Dorsal region broadly pinkish drab. The lateral region, embracing the spiracles, is bright orange, and below these dull flesh-color, sprinkled with white. The second segment has 8 rather large jet-black tubercular spots in front, and 3 others on each side. The remaining segments have each 14 smaller black tubercular spots, those of 11 being the largest. The anal segment has a black transverse line at the base, then 4 black spots, and a row of the same color united along its posterior margin.

Length, 1.30 inch.

Food plant. *Desmodium* sp.

Pupa. Dark chestnut brown, very glossy, and elongated toward the posterior extremity. Cremaster a long, slightly hooked spine. The segments are covered with close, fine punctures, and the spiracles are a darker brown.

Length, 0.80 inch.

PARALLELIA BISTRIARIS. Hubn. (No. 89.)

Larva. (Full grown.)

Slate color, with lilac tinge; the whole surface covered with waved lines and confused marks of a darker shade. The head is rather small, tapering in front, with 4 black longitudinal stripes. Between the segments is a greenish shade, and on each of these about 8 small white raised spots. The 10th, 11th and 12th have each a raised blackish line on the posterior half, that of 11 being the largest. Legs and feet striped with purplish brown.

Length, 45 mm.

Food plant. *Acer rubrum.* L.

GEOMETRIDŒ.

AMPHIDASIS COGNATARIA. Gne. (No. 32.)

Larva. (Full grown.)

Pale yellowish apple green. Head truncate in front, with 2 conical processes on the crown. Each of the segments is edged posteriorly with very pale dull yellow, and there are many very minute white and blackish warty tubercles scattered irregularly on the surface. There is a faint indication of a pale pinkish brown dorsal line. On the anterior portion of the anal segment is a warty protuberance of a brownish tint, surmounted by two cream colored processes. Thoracic feet and spiracles orange brown. Abdominal legs, green.

Length, 2.00 inch.

Food plant. *Melilotus*, *Acer* sp.

Larva changed to chrysalis. July 29. Imago, Aug. 13.

DESCRIPTION OF INTERESTING NEW SPECIES OF HETEROCERA FROM ALL PARTS OF OUR CONTINENT.

By B. Neumoegen.

Platythyris granulata. n. sp.

Antennæ, head, thorax, abdomen and legs grey. The tips of thorax and the abdomen, especially the former, powdered with orange.

Primaries of brownish grey color, traversed by innumerable little undulating lines from costa to interior margin, uniting into irregular small ovals at the intersection of the nerves, giving the appearance of numberless granules. These granules from base of wing to within a short space from exterior margin tinted with reddish orange. The space along exterior margin is grey. Fringes of a darker brownish grey than primaries, with a white curve at inner angle. An irregular, vitreous, discal spot at the inner edge of a greyish brown transverse band, which is broadest at costa and sharpens considerably at junction with interior margin. Along costa five irregular, partly triangular spots of straw yellow, two of them near inner edge of transverse band, one in the middle of the same, and two at the anterior edge of the band. Shape of wing curved at middle of exterior margin and at inner angle.

Secondaries concolorous, from base to within exterior margin, where the brownish grey prevails, the granules are likewise tinted with reddish orange. A vitreous discal spot, about four times larger than the one on primaries, of irregular square shape, cut in triangularly at anterior edge, giving it the appearance of having two pointed teeth. Wing curved in at centre of exterior margin and at anal angle.

Beneath, primaries and secondaries of light straw color, the transverse lines, which form the granules, of brownish color. Brownish shading near apex of primaries, the transverse band brown, and vitreous discal spot prominent. The five costal spots plainly visible. Brownish tinge near base and around discal spot of secondaries. Fringes as above.

Expanse of wings, 23 mm. Length of body, 6 mm.

Habitat: Fort Huachuco, Arizona. Type ♀, coll. B. Neumoegen.

Nemeophila Geddesi. n. sp.

Antennæ, head and abdomen black. Thorax, collar and an anal tuft of bright yellow. The abdomen has lateral stripes of straw yellow, and segmentary bands of same color near anus. Legs straw yellow.

Primaries black, with two prominent markings in straw yellow. One an oblique, broad, irregular band from costa to exterior margin above anal angle, thus separating the wing into an irregular, triangular, black apical patch. The inner part of this band edges off inwardly near median nervure, and runs parallel with same, thus giving the band the appearance of being toothed, the outer tooth only touching the exterior margin. The other is a broad basal stripe along median nervure, sharpening towards centre and nearly in conjunction with inner tooth of transverse band. A minute oval spot of straw yellow resting on middle of submedian nervure. Costa bright yellow near base, but fading off towards apex. Fringes black along exterior margin, but of straw yellow along interior margin to anal angle.

Secondaries black, with the following markings in straw yellow. An irregular, broad, mesial band along costa and running parallel at a distance with exterior margin, terminating at median nervules, where it is sharpened inwardly. An irregular shade, split by a black line, along abdominal margin, ending at anal angle, hooked inwardly. Fringes along abdominal margin and anal angle of straw yellow, thence along exterior margin strongly intermixed with black.

Beneath the markings are as above both on primaries and secondaries.

Expanse of wings, 29 mm. Length of body, 8 mm.

Habitat: Crow's Nest Pass, N. W. Brit. Cola. Type ♂, coll. B. Neumoegen. (Capt. Geddes.)

Dedicated to Capt. Gamble Geddes, of Toronto, who last season braved the inconveniences of a three months' sojourn in the Athabasca region, in order to enrich our science.

This beautiful insect was seen years ago by my friend, Mr. Hy Edwards, in a collection in Vancouver, but the superstitious possessor would not allow Mr. Edwards to make a description of it. Thus it has fallen to me to be the first one to describe it.

HALESIDOTA MINIMA. n. sp.

Head, thorax, patagiæ, abdomen pale, ochreous, hairy. Legs pale ochreous.

Primaries brownish, intermixed with ochreous tint. Maculations at base, along costa and at apices pale ochreous. Three irregular, undulating, transverse shadings from costa to inner margin; the two anterior ones accompanied by a row of irregular dots. The shading is the darkest around ochreous, basal maculation, and along exterior margin. One large, oblong, ochreous spot resting on costa, not far from base, followed by two, and more anteriorly towards apex, by three irregular, transparent spots, the latter being the start of the central transverse shading. Fringes brownish.

Secondaries immaculate, creamish white with concolorous fringes.

Beneath the markings on primaries are faintly reproduced, the ochreous tint at base and of anterior transverse shading more pronounced.

Expanse of wings, 31 mm.

Length of body, 6 mm.

Habitat: Fort Huachuco, Arizona. (Morrison.)

♂ Type, coll. B. Neumoegen.

This is the smallest of our Halesidotas, and, in appearance, the nearest relative to our H. Caryœ.

EULEUCOPHAEUS HUALAPAI, n. sp.

Head dark rose with yellowish tint. Prothorax, patagiœ, thorax very hairy, creamish white with scattered dark rose colored hair.

Abdomen very hairy, dark rose intermixed with creamish white hair and yellow tinted segmentary bands. Abdomen beneath light rose with with whitish tint Antennæ and legs bright yellow. The latter clothed with whitish rose hairs.

Primaries immaculate of very light rose color, along fringes and inner margin whitish. Costa bright yellow. A transverse, well pronounced, semi-transparent discal dash, surrounded by yellowish color. Light indication of a whitish transverse, oblique band, from costa near apex and parallel with outer margin. Light rose tint near base.

Secondaries of rose color, more intense near base. Fringes and hair along abdominal margin creamish white. A discal spot of the latter color.

Beneath, primaries and secondaries of bright rose; the secondaries of a lighter shade than primaries. Primaries from base and along median vein clothed with rose colored hair. Costa of the brightest yellow. A basal blotch, near conjunction of inner margin, of same color, and the course of the nerves indicated by yellow lines.

Base of secondaries near anterior margin clothed with rose and yellow hair. Fringes and hair along abdominal margin creamish white.

Discal spots visible both on primaries and secondaries.

Expanse of wings 2½ inches.

Length of body ⅝ inch.

Habitat: S. W. Arizona. (Morrison). Type ♀. coll. B. Neumogen.

This is a fine insect distinguishing itself by its rose tint.

HYPOPTA MANFREDI, n. sp.

Antennæ heavily feathered, light brownish, white stemmed. Thorax, abdomen and legs heavily furred with creamish white hair.

Primaries creamish white, fringes concolorous. Some minute, diffused sprinkling of light brown, and a discal dash of same color.

Secondaries somewhat darker, but uniform in color.

Beneath, primaries blackish with a lighter indication of discal dash of the surface. Near base and along larger part of inner margin a shade of creamish white and the fringes of same color.

Secondaries creamish white with a shade of light brown cast over it. Lightest near base and at anal angle.

Expanse of wings 30. mm.

Length of body 10. mm.

Habitat: S. W. Arizona. (Morrison.)

♂ ♂ Types coll. B. Neumoegen.

Named for Manfred Neumoegen.

This insect is much smaller than H. Bertholdi or H. Henrici and can be at once recognized by its plain color.

HADENA TRANSFRONS. n. sp.

Antennæ brown. Head grey. Thorax grey, intermixed with brown. Collar brown. Abdomen dark grey, shading into light brown beneath. Light brown anal tuft. Legs brown.

Primaries yellowish grey with maculations in light and dark brown, as follows: A dark brown marginal line along exterior margin; an irregular transverse line from near apex to interior margin, outwardly toothed at intersection of nerves; at costa, this line starts with an irregular, square, dark brown spot. The space between this line and exterior margin is yellowish grey, having a dark brown marginal maculation at centre of exterior margin and a more prominent, nearly triangular, dark brown blotch at inner angle. Through the centre of the space an irregular, transverse row of light brown dots. A second transverse line curving around base, starting with a dark brown blotch at costa and terminating with dark brown maculations at interior margin.

The interspace between the anterior and inner, basal transverse lines filled up with vivid light brown and having a large brown dash, pointing inwardly and resting on submedian nervure. A large, irregular square discal dot, surrounded inwardly by a prominent dark brown blotch, fringes yellowish grey, toothed with dark brown.

Secondaries uniform black, fading somewhat into greyish black toward base, fringes light brown.

Beneath, primaries dark brown fading into light brown at base and along interior margin. Indications of the anterior transverse line.

Secondaries light brown with a dark brown marginal band and a small, but distinct dark brown discal dot.

Expanse of wings. 26. mm.
Length of body. 9. mm.
Habitat: Deer River, N. W. Brit. Cola. (Capt. Geddes.)
Type ♂. coll. B. Neumoegen.
In appearance ranking near to H. Bridghamii, G. & R.

HADENA SMARAGDINA, n. sp.

Antennæ light brown. Head and thorax grey black. Abdomen and legs grey, with a blackish shade.

Primaries of a beautiful smaragd green, especially at base, along costa and exterior margin and at inner angle. Maculations, dark black, surrounded by brownish shades, giving the green wings much the appearance of being checkered with black, irregular square spots. Three transverse lines. The most anterior from apex to inner angle, undulating and consisting of irregular dots. The second, more inwardly, resting on middle of interior margin and similar to anterior line. The third curving around base from costa to interior margin. The interspaces between the transverse lines filled up by irregular checkers of brown shades, those between the inner curving line and the middle transverse line alternating in black and green. Fringes brown.

Secondaries greyish white, with broad, blackish marginal band from apex to anal angle, fading towards centre. Lightest at base. Fringes blackish, with a marginal line along exterior margin, of small, distinct black dashes. Faint indication of an undulating, transverse line through the centre.

Beneath, primaries greyish black, with lighter greyish shading at base and along interior margin. The middle transverse line and a small discal dot, of somewhat darker color, plainly visible.

Secondaries greyish white, with a shading of greyish black along costa and exterior margin. The middle transverse line and a small discal spot of greyish black, quite distinct.

Expanse of wings, 27 mim.

Length of body, 8 mim.

Habitat: S. W. Arizona. (Morrison.)

Type ♂, coll. B. Neumoegen.

This insect ranks certainly as one of the handsomest Hadenas of our country.

PSEUDANARTA FALCATA, n. sp.

Antennæ, head, thorax and abdomen light brown, with anal tuft of a lighter shade. Under side of abdomen and legs of the same lighter shade.

Primaries very pointed at apex, then considerably bulging out along exterior margin and rounding off at inner angle. Color of same a light brown. A light transverse line from near apex to interior margin; the space enclosed between the same and exterior margin of a lighter shade, darkening along the latter and showing faintly a marginal line of irregular dots from apex to inner angle. Another faint, oblique line from costa near base to middle of interior margin, nearly joining there the anterior transverse line. A faint, whitish reniform discal ring, having a larger, oblong, anterior companion ring. Fringes light brown.

Secondaries and fringes bright yellow, immaculate, with a distinct, broad black marginal band from costa to anal angle.

Beneath, primaries bright yellow, slightly dusted with brown grains along costa. A broad, black transverse marginal band, covering nearly one-third of the wing.

Secondaries bright yellow, slightly dusted with brown along costa. The same broad, black marginal band as on surface. A small black discal dot.

Expanse of wings, 20 mim.

Length of body, 8 mim.

Habitat: Ft. Huachuco, Arizona (Morrison.)

Type ♂, coll. B. Neumoegen.

The only representative of its tribe with falcate wings, so far known, nearing otherwise in appearance A. flava, Hy. Edw.

STIBADIUM CURIOSUM, n. sp.

Antennæ light brown. Head and thorax whitish grey, sprinkled with brown. Abdomen and legs whitish grey.

Primaries very pointed at apex; exterior margin bulging out at centre, but retracing towards inner angle, giving the cut of the wing a curious, falcate form. Color of primaries greyish brown, with intenser shading at centre of wing, the shading assuming somewhat the form of minimal granules. A transverse greyish white line from apex to near middle of interior margin, bending considerably inwardly at its centre. Another transverse line from costa, near base, to interior margin. The space enclosed by the two transverse lines being the most intensely colored part of the wing. A prominent, semi-circular black apical spot. A reniform discal spot, accompanied inwardly by another rounded dot.

Secondaries silvery grey, with blackish exterior margin, fading towards centre of wing. Indications of light mesial line.

Beneath, primaries of uniform brownish grey, somewhat lighter along costa and exterior margin. Secondaries of silvery grey, slightly dusted with light brown.

Expanse of wings, 25 mim. Length of body, 8 mim.

Habitat: South Arizona. Type ♂, coll. B. Neumoegen.

This insect proves to be of the genus Stibadium, in spite of its curiously formed primaries.

SCHINIA (PORRIMA) CARMOSINA n. sp .

Antennæ, head, thorax and abdomen dark grey. Abdomen beneath and legs of a lighter shade.

Primaries of a brilliant red purple color, nearing the tint of a light garnet, mixed with fleshy carmine tints. A broad transverse band of light brown, broadest at its start at costa, narrowing towards centre and widening at its termination on interior margin. The interior and anterior lines of this band are toothed with whitish color at intersection of nerves. The course of median and submedian nervures while crossing this band, indicated by lighter color. An exterior black marginal line, consisting of conspicuous black dots at termination of nerves. Fringes brown.

Secondaries of an uniform brownish black, somewhat fading towards base. with yellowish fringes. Slight indications of the discal dot.

Beneath primaries brownish black with lighter, greyish shades along costa, exterior and interior margins. At apex a blotch of bright carmine, purple tint, nearing the color of light garnet, diminishing in size and ending pointedly at centre of exterior margin. The latter dotted with black at termination of nerves.

Secondaries brownish black, fading into lighter color in centre and at base, being most intense at anal angle. A broad marginal shading from costa to middle of exterior margin of the same bright carmine purple tint, gradually fading towards centre. A large brownish black discal dot.

Expanse of wings, 28 mm. Length of body, 5 mm.

Habitat: Central Florida.

Type ♀. Coll. B. Neumoegen.

Undoubtedly one of the most brilliant North American Heliothinæ, and nearest relative to P. Sanguinea, Geyer, from which it is easily distinguished by its smaller size, intenser coloring, the dark grey head, thorax and body and the black secondaries.

DRASTERIA DISTINCTA, n. sp.

Head, thorax and body creamish white with a light bluish tint. Antennæ grey. Legs creamish white.

Primaries of a light blue tint with the following markings in brown: A transverse line of irregular dots from costa to interior margin, parallel with exterior margin. The dots resting at intersection of nerves. The two upper dots near apex the largest and most accentuated in color. Between base and this line two more irregular transverse lines, nearly connecting at interior margin, thus forming an irregular triangular space, the centre of which is marked by a large, transverse reniform circle. The space shaded with brown. A marginal brown line along exterior margin ; costa and fringes brown.

Secondaries creamish white fringes concolorous. From apex to anal angle a brown marginal, distinct line. Parallel with it, but pointed outwardly at centre, an undulating, mesial band, joining marginal line at anal angle. Indications of another interior mesial band of same color from centre of costa to abdominal margin, hooked in at conjunction with latter. Base densely shaded with brown, fading off along abdominal margin.

Beneath, primaries and secondaries creamish white, powdered with brown grains. Small brown discal spot on primaries. Marginal lines of both wings distinct.

Expanse of wings, 28 mm. Length of body, 7 mm.

Habitat: Belly River, N. W. Brit. Cola. (Capt. Geddes.) Types, ♀ ♀. Coll. B. Neumoegen.

D. distincta is near to D. coerulea, but not as vividly colored and plainly distinct at first glance by its creamish white secondaries.

SYNEDA ATHABASCA, n. sp.

Antennæ, head, thorax and abdomen grey. Abdomen beneath and legs very light grey.

Primaries very dark, nearly blackish, grey ; fringes concolorous. A broad, light grey marginal band, accentuated by a dark grey blotch at apex, and terminating at inner angle, having an anterior black marginal line. A broad, light grey, oblique band, from costa near base to middle of interior margin and nearly joining at latter the marginal band. The space between the oblique and marginal bands very dark grey, having at its upper centre a prominent irregular square, discal blotch of whitish grey, from costal to median nervures, being toothed at intersection of nervures.

Secondaries yellowish white. A black marginal line from apex to anal angle, having two triangular black blotches, pointing inwardly.

A prominent, broad, undulating black mesial band from costa to anal angle, joining at latter the marginal line. A black basal dash along abdominal margin, and a prominent black, discal line, resting on median nervure, the inward course of which it marks in black, fringes yellowish white with black, intermediate maculations.

Beneath, primaries and secondaries milky white with black maculations. Primaries have a distinct marginal line, anterior transverse undulating band, large discal spot of black. Secondaries have likewise the marginal line with blotches, the undulating mesial band and the discal line of black.

Expanse of wings, ♂ 25 mm. ♀ 27 mm. Length of body, ♂ 7 mm. ♀ 8 mm.

Habitat: Belly River, N. W. Brit. Col. (Capt. Geddes.)

The smallest, but one of the most graceful-looking of our Synedas.

THE MACHAON CONTROVERSY.

Sir,—The note in the Machaon controversy in the May–June number of "Papilio" was written by me immediately after reading Mr. W. H. Edwards' article in the March number, and was, if I mistake not, in the form of a letter, as I did not consider it of sufficient importance to make an article of it. Since then, however, I have been in Boston, and through the kindness and courtesy of Dr. Hagen I have had an opportunity of carefully examining the fine and remarkable series of Papilios collected by him and his associates last summer, and my views have been modified in consequence. As the result of this examination I find that the striped ocellus figured by Mr. Edwards as the typical form in Oregonia is not at all common among these specimens, most of them having the pupil broadly pear-shaped above, sometimes nearly triangular and sometimes even separated from the interior anal band, and so closely resembling that of Zolicaon. One specimen in which the ocellus and pupil were nearest that figured as Oregonia by Mr. Edwards, has a black cell and a nearly black body. One specimen has the pupil on the upper side very slightly clubbed, and sloped down very near to the inner edge, so as to closely resemble in this particular a specimen of Machaon from Koolloo, in the Himalayas. This wide variation in the form of the pupil of the ocellus is very marked. Mr. Edwards says on page 55, that "the marginal yellow spots of these several members of the Asterias group are very similar to those of Zolicaon." From the extreme variation of these spots in these specimens, I should judge that they must be worthless for the separation of species.

Mr. Edwards says that these specimens are hybrids. This is, I suppose, possible; but is it probable? For my part, I do not believe that a party collecting a large series of butterflies would find nothing but hybrids.

In conclusion, I would simply state that in my humble opinion there is more to be learned about these forms than either Dr. Hagen or Mr. Edwards can at present tell us.

Yours respectfully,

H. H. LYMAN.

Montreal, Sept. 17, 1883.

SOME SPECIES OF EUCHŒTES.

By Henry Edwards.

Considerable confusion has hitherto existed among entomologists in the determination of the species of this genus hereafter referred to, many lepidopterists having fallen into the error of believing them to be forms of one and the same thing, and regarding *E. collaris* as merely an albino state of *E. egle.* In many cabinets it is still so named, but it has remained for Mr. S. Lowell Elliot, of New York, to clear away all the existing difficulties, and to place the several forms in their proper rank as species. And here I would wish publicly to pay my respect to Mr. Elliot for the vast services he has rendered and will hereafter render to entomology, by the persevering and earnest manner in which he has reared a great number of lepidoptera through all their stages from the egg upwards, and the unparalleled care he has taken to prevent any mixing together of species, thus avoiding any possibility of mistake. Thousands of examples have passed through his hands during the past two years, the larvæ being described in all their moults, and watched with unremitting attention. To Mr. Elliot American lepidopterists will, when the results of his observations are fully known, owe a debt of gratitude it will be difficult to pay. In the genus *Datana* alone upwards of 10,000 specimens of the various forms have been under his care, and the differences between them carefully and studiously noted. In the present genus enormous numbers of specimens have been raised, and the results here stated are beyond the chances of error. It will be seen that the fall brood of *E. eglenensis* is white, and superficially resembles *E. collaris*, while the spring brood is lead color, and closely approaches *E. egle.* This will help to account for the erroneous impressions I have referred to as to the association of the several species under one. I have thought it wise to include in this paper redescriptions of all the species, under the new light given to them by the efforts of Mr. Elliot, and have also given names to one variety of *E. egle.* and to a probable species allied to *E. collaris.* The first of these was noted by Mr. Grote, and I append his description, applying to the insect the name given to it by him. The other has, I believe, so far been taken only by myself in the Yosemite Valley, California. Its early stages are unfortunately unknown to me, but the present reference to it may, I trust, attract the attention of observers, and finally bring us some information as to its larval condition.

EUCHŒTES COLLARIS. Fitch.

Larva. (After 2d moult.)

Body color, greenish-white. Head, slightly testaceous. The body is covered with very long, sordid, white hairs, those of the anterior portion the longest. A darker dorsal line, contrasting with the white ground-color.

Length, 8 mm.

(After 3d moult.)

The body has now become a clearer white, and the hairs are disposed more in the form of tubercular tufts, and not irregularly, as in the previous stages, the segments being marked by a deeper shade.

Length 12 mm.

(After 4th moult.)

Wholly sordid white; the hairs now plainly disposed on pale tubercles, each bearing a large tuft of hairs, which are cream-white at their base, slightly stained with dusky at their tips.

Length, 20 mm.

(After 5th moult.)

Head pale, testaceous. The hairs have now become pale mouse color, varying in some individuals to a darker shade. The body color and that of the legs are now dull greenish-white.

Length, 28–30 mm.

Food Plants:

Asclepias, of several species; and *Apocynum cannabinum*. The larvæ feed only at night, hiding themselves during the day at the foot of their food plant.

Imago. Palpi, fore coxæ, abdomen above, part of thorax, a costal streak *continued to the apex*, and the costal edge of secondaries beneath, bright buff. The abdomen has three rows of black spots, those of the dorsum the largest. The wings are pure white above, rather acute at the apex; the primaries with a sub-costal, lead-colored shade beneath, not reaching to the apex. The abdominal spots are occasionally almost obsolete.

Exp. wings, ♂, 35 mm. ♀, 42 mm.

EUCHŒTES YOSEMITE, n. sp.

Wings pure white above and below, except a buff shade on the costa of primaries, *not extending beyond the basal third*, and a very slight lead-colored sub-costal shade beneath. *Costal edge of secondaries, cream white.* Abdomen cream-white, with the posterior edges of the segments pale buff. Dorsal black spots quite conspicuous. Otherwise, as in *E. collaris*

Exp. wings, ♂, 45 mm. ♀, 48 mm.

From several examples taken by myself in the Yosemite Valley, California.

The difference between this form and our common species will, I think, be easily seen upon comparison ; the larger size, white abdomen, and shorter buff costal streak being strong characters, entitling it, I think, to rank as a species. The whole of the examples I saw were constant in their markings, not less than 20 having been examined by me.

EUCHŒTES EGLENENSIS. Clem.

Larva. (Full grown.)

Body wholly bright dark orange. Head rather small, shining. On each segment are 7 tufts of mouse-colored hairs, those of the second and third segments being the longest. These hairs spring from small brownish tubercles. The base of abdominal legs, brownish at the sides.

Length, 1.10 inch.

Food Plant, species of *Asclepias*, but chiefly *A. tuberosa*.

Imago. (Fall brood.):

Wings white, with a pinkish or lead-color tinge. Costal margin distinctly buff for its basal half. Abdomen bright buff, strongly marked with the usual rows of black dots. Apices of the wings more decidedly rounded than in *E. collaris*, and the lead-colored shade beneath extends more generally over the surface. The veins of the upper and lower wings also are decidedly marked with yellow. Palpi and legs as in *E collaris*.

(Spring brood.):

With the same markings, but the whole upper and lower surfaces of the wings are bright mouse-color, this shade encroaching on the collar of the thorax and the fore coxæ.

Exp. wings ♂, 30 mm. ♀, 32 mm.

EUCHŒTES EGLE. Drury.

Larva.

Black, entirely covered with long hairs and tufts. Dorsal region wholly black. From each side spring 11 bunches of bright orange hairs, which almost meet each other on the dorsum. From the 2d and 3rd segments arise 4 long pencils of black hairs. From the 4th, 2 pencils, and behind these 2 smaller but longer ones, all of clear white. These are all directed anteriorly. From the 11th and 12th spring other long black pencils, 2 to each segment. These are directed posteriorly. Behind these again are 2 pencils of clear white hairs. The anal segment bears a long and fan-like black tuft. From the sides of the middle segments spring shorter pencils of black hairs, directed laterally, and below these, covering the spiracles, are some sordid white tubercular masses of hairs, as in some *Arctias*.

Length, full grown, 1.10 inch.

Food plants, various species of *Asclepias*, but chiefly *A. cornuti.* Desc.

Imago. (Spring brood.):

Stouter and heavier in appearance than any of the previous species. Entire surface, with the exception of some buff stains at the base of the head, of the wings beneath, and the junction of the coxæ, bright mouse-color, the secondaries rather darker in tint. There are no markings whatever upon the wings, and the buff costal edge is entirely wanting. The abdomen is buff above, cream white below, with the usual row of black spots, and in the ♀ the anal segment is broad, cream white, in strong contrast to the rest.

(Fall brood.):

In this, there is upon the primaries of both sexes, a very decided band of a darker shade than the ground color, very oblique, and deeply dentate outwardly. There are also numerous whitish scales scattered over the surface of the wing. This form has been described by Mr. Grote, though never published, as *E. cyclica.*

Exp. wings, ♂ 30 mm. ♀ 38 mm.

With regard to the distribution of the species, I may state that I have seen no examples of *E. eglenensis*, except from Pennsylvania, New York, and the New England States, while *E. egle* and *E. collaris* appear to have their range as far south as Texas, the former of these also appearing in Arizona.

THE GENUS ARCTIA AND ITS VARIATIONS.

By B. Neumoegen.

My good friend, the Rev. Geo. D. Hulst, has lately given us in the Bull. Brooklyn Ent. Soc., vol. ii., p. 69, some interesting accounts about the raising of a number of imagos from the eggs of A. Excelsa, Neum. They proved to be varying greatly, as he says, starting with forms near A. decorata through the F—pallida, Excelsa forms, winding up with specimens tallying with A. figurata. The genus Arctia is extremely variable in its ground forms, as everyone knows, and that specimens greatly varying from the same and highly aberratic should have been baptized by specific names, is only too natural. I myself had some misgivings at the time of naming A. Excelsa as a species, but as the fundamental form was not then known, I preferred to have it go as a species ; the present discovery, to my pleasure, teaches me that it is an aberratic form. While my friend Hulst has been quite successful in establishing interesting facts and thus partly sifting some of the mysterious conceptions of years' standing, I think he has rather been too liberal in his conclusions, which do not warrant his positive way of stating "the synonomy of A. Nais 'stands' as follows," or "the insect 'stands' A. Parthenice v. Anna." Although I do not in the least harmonize with many of my entomological friends, who, microscopically, dissect a fundamental form into so many varieties, I still more object to the very recent mania of "lumping" species. Future entomologists will easily know that, for instance, by Cat. Carissima, Hulst, a certain varietal form of C. Cara is meant. Will it be just as easily taken, that A. placentia, Abb. & Sm., or A. Snowi, Gr. are the same insects as A. Nais, because it has been proven that A. Phalerata, Phyllira and Excelsa are aberratic forms, the first one of Nais, the latter two of Figurata? Varieties are the heralds of coming species; why then retrench the obvious plan of nature instead of submitting to it? Mr. Hulst has raised various forms, mentioned before, from Excelsa eggs, but not the true Nais form; why then the conclusion that Nais is the typical insect of these forms? Still more problematical is the decision that *A. Blakei*, *determinata*, *Bolanderi*, *superba*, should be included into the same species of *Nais*. Will future students take it for granted, by dint of such decisions, that *A. Bolanderi* from Oregon and Athabasca (from the latter locality I received it lately through Capt. Geddes), and A. Phyllira from the Southern States have the same larvae? As soon as my friend Hulst has raised them from the same brood of caterpillars, I shall say: Probatum est!

Collectors of Chicago (Mr. Bolter and Mr. Worthington) and of Canada (Capt. Geddes and others), have found the larvae of *A. Decorata* considerably differing from *A. Nais*, so has Prof. French, of Carbondale, Ill., as my friend Hulst says; why then does he place it as a var. of Nais?

Some studies and examinations which I have been making lately, prompt me to the following opinion:

A. Saundersii is a good species and distinct from *A. Parthenice*, Kirby. *A. Parthenice* is an aberratic form of *Virgo*, in which the cross and transverse bands of primaries are much broader than in *Virgo*, the secondaries having very few and small black maculations. In the collection of Mr. Hy. Edwards are some samples bearing out the true specifics of *Parthenice*.

A. flammea, Neum., is a varietal form of *A. Placentia*, Abb. & Sm.

A. Placentia and *A. figurata* have no specific connection. The caterpillars are entirely different, as figured in the Lepidoptera of Georgia, by Abb. & Sm.

I possess the type of *A. Anna*, Gr., which is undoubtedly an aberration of *A. Persephone*. Had my factotum, Mr. Doll, been fortunate enough to carry a number of larvae of *A. Persephone* through the various moults, it would have been settled to a certainty that *Anna* and *Persephone* are from the same stem. Unluckily, Mr. Doll did not succeed.

A complicata, Wlk. is a *var. ochracea* of *A. Achaia*.

A. *Edwardsii*, Str. will probably prove to be a varietal form of A. *Achaia*, Gr. & R.

A. *Blakei* and A. *determinata* may have specific relation, but cannot be authenticated so far.

A. *Nevadensis*, Gr. & R. is a varietal form of A. *incorrupta*, Hy. Edw., which is the ground form.

A. *Quenselii*, Geyer, *Gelida*, Mösch., and *Speciocissima*. Mösch. are synonyms.

A. *Docta*, Wlk., *mexicana*, Gr. & R., *Autholea*, Bd. and *Arizonensis*, Str. are variations of the same insect, Walker's name having the precedence.

A. *Dahurica*, Bd. may prove to be only *Complicata*, Wlk., which latter, as mentioned above, is an ochraceous var. of *Achaia*.

A. *intermedia*, Str. is distinct from A. Saundersii and I do not see why Mr. Grote placed them as synonyms. *Intermedia* is much larger than Saundersii and differs in its transverse and cross bands vastly from the latter.

A. *Stretchii*, Gr. may prove to be only a variety of A. intermedia. I have the type of Stretchii and the following note of Mr. Grote is attached to it: "Differs by the basal band on forewings." This is about the only difference, in fact, which I can see between A. Stretchii and A. intermedia.

A. *Dione*, Ab. & Smi., I can positively state, is a distinct species from A. Arge, Dru. It is much larger than Arge, has very small, black maculations on primaries; the cross bands are in fact, no bands but simply a line of black dashes. The wings are of a creamish white color; but the main distinction is in the abdomen, which is creamish white and has neither black dorsal nor black lateral stripes, but simply two black anal dots. I owe it to the kindness of Prof. H. A. Hagen, that I was enabled to elucidate these facts. He lent me two typical examples of Dione, property of the Cambridge Museum, for examination. They were caught many years ago by the late Prof. Agassiz in Texas and were labelled hitherto "Arctia n. sp."

According to the opinion expressed herein, I should classify our Arctians for the present as follows:

Arctia, Virgo L.
  " ab. Parthenice, Kirby.
  " ab. Intermedia, Str.
      var. Stretchii, Gr.
  " Saundersii, Gr.
  " Rectilinea, Tr.
  " Persephone, Gr.
      ab. Anna, Gr.
  " Nais, Dru.
      v. Phalerata, Harr.
  " Decorata, Saund.
  " Figurata, Dru.
      v. Celia, Saund.
      v. F. pallida, Strk.
      v. Quadrinotata, Strk.
      v. Excelsa, Neum.
      v. Phyllira, Dru.

Arctia, Placentia, Abb. & Sm.
    v. Flammea, Neum.
" Snowi, Gr.
" Determinata, Neum.
" Blakei, Gr.
" Superba, Str.
" Bolanderi, Str.
" Yarrowi, Str.
" Incorrupta, Hy. Edw.
    v. Nevadensis, G. & R.
    v. Ochracea, Neum.
" Docta, Wlk.
    v. Arizonensis, Str.
    v. Autholea, Bd.
    v. Mexicana, G. & R.
" Virguncula, Kirby.
" Achaia, Gr. & R.
    v. Barda, Hy. Edw.
    v. Complicata, Wlk.
    v. Ochracea, Str,
    v. Dahurica, Bd.?
" Quenselii, Geyer.
        Gelida, Moschl.
        Speciosissima, Moschl.
" Geneura, Strk.
" Williamsii, Dodge.
" Edwardsii, Str.
" Dione, Abb. & Sm.
" Arge, Dru.
" ab. Michaho, Gr.

Whether some of the species can "stand" as such, we shall have to leave to future discoveries for positive proof. My thanks are due to Messrs. I. Doll, Hy. Edwards, Geo. Frank, Capt. Geddes and Dr. H. A. Hagen for valuable information. I trust that Mr. Hulst will take no umbrage at my remarks, as in the friendly contest for science, both victor and vanquished gain.

CONCERNING SO-CALLED SPECIES OF BUTTERFLIES.

BY H. J. ELWES. PRESTON, CIRENCESTER.

Dr. Hagen's paper on Papilio Machaon and its allies has already brought down on him severe criticism from Messrs. W. H. Edwards and Butler, who are the leading representatives of a particular school in Europe and America; and though Dr. Hagen can doubtless fight his own battle in so good a cause, and defend himself without the help of others, yet I should like to make a few remarks on the controversy. Mr. Edwards seems to think just as Mr. Butler did when I ventured some notes on the Genus Colias three years ago in the Transactions of the Entomological Society, that because a man has not been a lepidopterist and nothing else all his life, he has no right to speak or to have an opinion on the subject. It seems to me, however, that the best possible training for the study of any branch of natural history is a previous acquaintance with some other branch.

And the mere fact that Dr. Hagen is allowed by his opponent to hold a high rank in other branches would dispose me without knowing personally anything of himself or his work to allow greater weight to his opinions on lepidoptera.

I have noticed that men who have studied one branch of biology in one country only, are usually more ready to give importance to trifling characters than those who have observed the marvellous variation of birds, insects, and plants, in many parts of the world. Perhaps nothing does so much to shake one's faith in the fixity of species as horticulture, though breeding butterflies from the egg seems to have had the opposite effect on Mr. Edwards.

If, however, this gentleman and others had always waited till they had reared an insect before describing it, neither I or any one else could object, however narrow their views as to what constitutes a species might be, as there would in that case be solid foundation for their opinions.

But it is quite another matter when we find a crowd of new forms described on the sole evidence of one or more specimens brought on by some traveller, which happen to differ slightly from those already known, and when the descriptions are unaccompanied by figures, they give little or no help to identification.

To enter into the question of Papilio Machaon and its allies would take more time than I can now spare, but I hope before long to show that there is a much greater resemblance between the butterflies of the Nearctic and Palæartic regions, than has been hitherto allowed by most American writers. In fact, I believe that as far as butterflies go, these two regions cannot be separated at all, for though numerous genera occur in the warmer parts of the United States, which are not represented in the old world, yet they cannot be called dominant genera, and for the most part are either small monotypic genera or representatives of neotropical genera which have strayed northward and been able to maintain their ground where climatic conditions are favorable, just as in the Eastern Palæarctic region several tropical Indian forms are able to exist far beyond the limits of the region to which they naturally belong. Both in the United States and in Japan we have similar instances among birds and plants, which it would be out of place to mention here, though any naturalist will call to mind such cases in geographical distribution.

As I have lately been studying the genus Argynnis, I will now ask Mr. Edwards publicly, what I have asked privately without result, how I am to distinguish with certainty from their allies the following species, all of which being enumerated in the last part of his great work are, I presume, considered by him to be worthy of recognition.

Argynnis Nitocris Edw. Tr. Am. E. Soc. 5 15 1874.
" Carpenteri Edw. l c. 5 204 1876.
" Electa Edw. Field and Forest, 3 143 1878.
" Hippolyta Edw. Can. Ent. 11 82 1879.
" Laura Edw. l. c. 11 49 1879.
" Chitone Edw. l. c. 11 82 1879.
" Macaria Edw. Field and Forest, 3 86 1877.
" Clio Edw. Tr. A. E. Soc. 5 106 1874.
" Artonis Edw. l. c. 9 2 1881.

So far as I have been able to consult the description of these species I find nothing to guide me in accepting or rejecting them, but those published in the *Field and Forest*, I have not been able to consult at all, as that journal is not accessible to me in England.

There are no specimens of any of these species in any European collection that I know of, and if there were, I could not trust to them unless identified by Mr. Edwards himself.

The only information I can get about them from America is that the types are in Mr. Edwards' collection, and that they are elsewhere not to be met with at present. What would American naturalists think of it if I published descriptions of forms which existed in my collection alone, in such a paper as *Land and Water?* Would not they be quite right to ignore them? I say yes, without hesitation.

The number of scientific journals is now so great, and some authors seem to take so much pleasure in scattering their descriptions broadcast that unless some stringent rule is laid down to check the present practice it will be impossible to work at all without a public library of reference at hand, and even there the number of books one must have on the table at once is incredible. All this trouble might be avoided if a rule was made that only certain specified publications should be recognized as the medium for describing new species, and that the descriptions must either be accompanied by a figure, or give specific characters,by which the species could be certainly recognized. Without this, descriptions of nearly allied forms of Colias, Argynnis ,Lycæna, and many other genera are practically useless. Compare Mr. Stretch's remarks on the genus Arctia. Papilio, vol. II., page 90.

Mr. Edwards says on page 60 that in all his experience of breeding butterflies from the egg, whilst what many had supposed to be mere varieties had often turned out distinct species, yet he does not recollect one instance where the reverse had taken place, and a form which he had supposed on the strength of the imago only to be a species had turned out by breeding to be a variety only.

I will leave it to others to say how far this coincides with their experience, but will call attention to a passage in Dr. Rossler's Lepidoptera of Wiesbaden, 1881, pp. 87–88, in which, speaking of Agrotis tritici, he says that out of the great number of specimens of this species which he raised in 1871-72, the following plates in Hubner's & Herrich Schaffer's works were all richly represented:

Hubner.—*A. fumosa* 153. *A. aquilina* 135. *A. obilisca* 123. *A. fictilis* 479 and 710. *A. unicolor* 544. *A. eruta* 623. *A.*

carbonea 700. *A. praticola* 567. *A. vitta* and *A. aquiliana* 533–53. *A. ruris* 416.

Herrich Schaffer.—*A. adumbrata* 121. *A. rustica* 495. *A. formosa* 526. *A. tritici* 527–52. *A. obelisca* 529–53.

Of these are 15 forms which were supposed by two of the highest authorities on European lepidoptera to be good species and which are arranged as follows by Dr. Staudinger:

A. nigricans Linn = fumosa Hb. 153=rustica H. S. 526=carbonea Hb. 700, var. lubricans Esp. = rustica Hs. 495.

A. tritici Linn, H.S. 104 529–30=var. vitta H.S. 103 527–8; var. eruta 4 Hb. 623 = tritici H.S. 527–8; var. aquilina Hb. 135 — fictilis Hb. 79 —praticola Hb. 567.

A. vitta Hb. 533–4.

A. obelisca Hb. 123; H. S. 103 529–30; ab. ruris Hb. 416; var. Villersii Gn. — obelisca H. S. 532 — fictilis Hb. 710.

A. adumbrata Ev. H. S. 121.

thus reducing the 15 supposed species to 5; every one was according to Dr. Rossler (who, no doubt, has the specimens to prove his statement), not only bred in one season in one locality, but so much united by transition forms, that to use his own words "it cannot be otherwise than that they all belong to one and the same species."

As this species occurs in North America, and is no doubt just as likely to vary there as in Europe, the synonomy of the former will be a pretty little amusement for a future generation of naturalists, and I have no doubt they will not bless their predecessors; but how would the case have stood if instead of publishing good figures, as Hubner and Herrich Schaffer did, only descriptions had been given. To ignore the names would have been the only safe course, and I feel sure that many names already given, if not identified during the life of their authors and with their help, will certainly be ignored by their successors.

As to Mr. Butler's remarks about Terias, he no doubt feels hurt that his Japanese species, which may be judged of from the plate in Trans. Ent. Soc. Lond., 1882, p. 197–9, should be so soon attacked by the only man really able to do so at present, namely, Mr. Pryer; but how much better would it have been for him and others if he had adhered to the principles expressed by himself in his Revision of the Genera of Pierinæ Proc. Zool. Soc., London, 1881, page 526, where he says, in speaking of Terias, "I shall not therefore increase the difficulty of determining the already numerous and nearly allied species by describing all the unnamed forms at my disposal, but shall rather strive to lighten the labors of my fellow-workers by clearing up to the best of my ability the somewhat confused synonomy already existing."

In conclusion I must say that I look forward with the greatest interest to Dr. Hagen's promised remarks on the species of Colias and other genera, and beg to assure him that however much hostile criticism he may draw from some persons, he will deserve the hearty thanks of all who, like myself, are anxious to see the study of Lepidoptera put on a more scientific footing and a check put on the practise which is so prevalent in certain quarters of describing at random every thing which seems to show variation.

I repeat what I said in my paper on butterflies of China and Japan in Proc. Zool. Soc., London, 1881, p. 857, "that the time was gone by when species could be described wholesale without comparison with a series of all the allied forms in neighboring regions."

NEW SPECIES OF ÆGERIADÆ.

BY HENRY EDWARDS.

SCIAPTERON PRÆCEDENS. n. sp.

Allied to *S. polistiformis*, Harris, but narrower in the wings, smaller, and of different coloration. Antennæ, brownish orange, black at the tips. Head and thorax black, with some red scales. The tegulæ are bright reddish brown. Abdom., glossy black, with some red scales laterally at base. Three anal segments and caudal tuft bright lemon yellow. Fore wings brown, with a basal vitreous streak, stained along the internal margin with dull red. Hind wings vitreous at their base, the vitreous space a little larger than in *S. polistiformis*. Beneath, both wings are streaked with red and yellow. The femora are reddish, tibiæ black, hind tarsi lemon yellow.

Exp. of wing, 30 mm. Length of body, 14 mm.

1. ♀ N. Carolina. Coll. B. Neumoegen.

The yellow tip to the abdomen will at once serve to distinguish the species.

ÆGERIA BOLTERI. n. sp.

Size of *Æg. fulvipes*, Harris. Palpi, deep orange. Thorax, head, antennæ and abdomen, brassy brown, the latter with a very broad belt of fiery copper-red around 5th and 6th segments. Hind tibiæ and tarsi brownish, the latter silvery white within. Fore wings with margin very narrow purplish black. The discal mark also purplish black, edged posteriorly with golden orange. The opaque space is wholly golden orange, with purple streaks. Caudal tuft, brown black.

1. ♂ N. Illinois. Collected by my friend, Mr. A. Bolter, to whom I dedicate the species. Type. Coll. Hy. Edwards.

ÆGERIA ÆMULA. n. sp.

Very like *Æg. tipuliformis*, *L.*, but much smaller and slenderer in all its parts. Palpi, sides of the thorax beneath, coxæ, and anterior legs pale lemon yellow. Posterior legs banded with bluish black. Thorax above bluish black, with narrow pale lemon yellow lateral stripes. Abdomen bluish black, with four narrow bands of pale lemon color. Caudal tuft bluish black above and beneath; lemon yellow at the sides. Fore wings, with the opaque portions narrower than in *Æg*-

tipuliformis, but of the same color. The fringes of both wings are also much narrower than in the common species, and of less coppery hue. The species has the appearance, however, of a much dwarfed form of *Æg. tipuliformis.* It may possibly be *Æg. scitula*, Harris, but it does not agree with his description, and in the absence of his type for comparison, I am not able positively to decide the question.

Exp. ♂ 8 mm. ♀ 10 mm.

Types. Coll. Prof. C. V. Riley.

PYROHOTÆNIA WITTFELDII. n. sp.

Allied to *P. Floridensis*, Gr., and *P. Texana*, Hy. Edw., and apparently intermediate between them. It is the size of the latter (20 m.m.) Antennæ blue black. Head, thorax, and abdomen brownish black; the head with narrow orange band at base, and the thorax with rather broad lateral bands of the same color. The abdomen has 3d, 5th, and 7th segments rather broadly banded with orange above and below. Caudal tuft wholly brown-black. Palpi, edges of fore femora, and some bands on the hind tarsi, orange; on the rest of the legs and under surface brownish black. Fore-wings greenish black, internal margins and a dash behind the discal mark bright orange. Fringes of both wings brown-black. Beneath, the fore-wings are bright orange for the basal two-thirds, the rest brown-black, with the discal mark purplish.

2. ♂ Indian River, Florida. Dr. Wittfield.

Type. Coll. Hy. Edwards.

PYRRHOTÆNIA SUBÆREA. n. sp.

♂. Whole upper surface bronze black, except the antennæ, which have a white band about 3 m.m. from the tip. The hind wings are vitreous for about their basal third. Beneath, the palpi are white, as are also the joints of the tarsi, and on the wings at base are some faint greenish streaks.

Exp. wing, 14 mm. Length of body, 9 mm.

1 example. Arizona. Coll. B. Neumoegen.

PYRRHOTÆNIA ANIMOSA. n. sp.

. ♂ Brassy black. Thorax with the tegulæ bright reddish orange. Abdomen, with the 3 posterior segments and the caudal tuft, reddish orange. Fore-wings, with rather wide streak of same color along internal margin. Hind wings vitreous; marginal border rather narrow. Beneath, the palpi are reddish orange; tibiæ and tarsi brassy black. The streak along internal margin of fore-wing is here dull yellow.

Exp. wings, 17 mm. L. body, 11 mm.

♀ Hind wings entirely opaque. The 3 anal segments of the abdomen are reddish orange only at the sides. In all other respects resembling ♂.

Exp. wings, 20 mm. L. body, 12 mm.

4 ♂. 2 ♀. Arizona. Coll. B. Neumoegen and G. H. French.

PYRRHOTÆNIA GELIFORMIS. Walker.

(*Œgeria geliformis*), B. M. Cat. P. 8.

Head, antennæ, thorax and basal joint of abdomen brassy black, the head with a few bluish scales at the base. Fore wings wholly opaque, greenish black, with bright metallic reflection, becoming more golden at the margins. Hind wings transparent, with greenish black margin, widest at the apices. Fringes, broad golden brown. The abdomen, except the basal segment is bright coppery red; the caudal tuft slightly stained at the sides with greenish black.

Exp. wings, 18 mm.

1 ♂ .Archer Co., Florida. A. Koebele. Coll. Prof. C. V. Riley.

A very handsome species. The above description is republished, as the original by Walker appears to have been made from an imperfect specimen.

I have recently received from my kind friend, Dr. Carlos Berg, of the University Buenos Ayres, four species of the group, one of which appears to be new, and which I gratefully dedicate to the donor.

MELITTIA BERGII. n. sp.

Palpi and fore tarsi dark orange. Antennæ, femora, tibiæ and hind tarsi bluish black. Thorax and abdomen dull black with a brassy reflection. Fore wings opaque, dull orange, with the costa blackish, the black mark widening gradually from base to the end of cell, then narrowing to the apex. Hind wings also orange, opaque at the base, and along costa, transparent outwardly, except on the edges of the nervules. Under side the same as the upper.

Exp. wing, 37 mm. Buenos Ayres. Dr. C. Berg.

The other 3 species sent by Dr. Berg are *Œgeria albicalcarata*, Burm, *Melittia cyanifera*, Burm, and *Melittia ceto*, Westwood. I have also received an example of the last named species from Mr. W. Schaus, Jr., taken by him near Jalapa, Mexico.

NOTES UPON A SMALL COLLECTION OF BUTTERFLIES, MADE IN JUDITH MTNS., MONTANA, IN 1883, BY WM. M. COURTIS, M. E.

BY W. H. EDWARDS.

THIS collection was made by my correspondent, at such times as he could find leisure, which was not often, and under difficulties, having for some weeks no proper net-ring, but something extemporized out of a willow switch for the occasion. But, though it embraces no large number of species, it is interesting for the information it gives of distribution, and of the varieties of certain species. There is also one new Papilio.

1. Papilio **Eurymedon**, Bd.
2. " **Daunus**. Bd. The most northern locality known to me.
3. " **Nitra**, new species, described below.
4. Parnassius **Smintheus** Doubl., var. **Hermodur**, H. Edw.

Mr. Edwards describes this form in Papilio, 1, 4, from a female in collection of the late Dr. James Bailey, and taken in southern Colorado. This expanded 2.3 inches. He compares it with *P. Corybas*, Fisch., from the Altai, an example of which in his collection measures 2.65 inches. These Montana examples, of both sexes, are very large, considerably beyond the average of *Smintheus* from Colorado, some males and females reaching 2.7 inches. Several of the females are very black, there being but little of the yellow-white ground left, and that principally in cells of primaries and on disks of secondaries. Others have the yellow-white over most of secondaries, and in cell and next base of primaries, but the outer half of primaries is melanic and transparent, with only a submarginal row of yellow spots on that area. The red spots are of extraordinary size. I should have taken the female for a distinct species had not the male been so like, and often undistinguishable from, the Colorado males of *Smintheus*, though, as before said, larger. Some of them have the spots orange, as in var. *Behrii*. Several of both sexes I cannot distinguish from a pair of *P. Intermedius*, sent me by Dr. Staudinger, as Menetries' species, from Siberia. These are the examples in which there is an absence of melanism, and the marginal borders of both wings are transparent. I have a ♀ of this same form, taken on Mt. Bradley, California, by Mr. James Behrens.

Mr. Courtis, at my suggestion, shut up some of the females with Sedum, on which *Smintheus* has been known to lay, and obtained 140 eggs, all which I have now in an ice-box, hoping to carry them through the winter, and to hatch them at the time I can get plants of Sedum here. Mr. Courtis says: " Most of these eggs came from females *that mated after I caught them*. The others would not lay, although I kept them shut up with several males until they nearly starved." (The first instance I remember to have heard of, in which butterflies have mated in captivity.) "The virgin females seemed to have the *end of abdomen of a light green horn*, instead of black, but after mating I noticed they turned black. I think they lay on the roots of plants, as the females always drop to the ground, climb up a stalk and fly away. Those in confinement climbed sticks and window frames, laying eggs as they went. They curved their bodies round and put an egg on whatever they touched *except the Sedum*. I made one lay on it by keeping her moving from one piece to another, but she seemed much excited, and as soon as I put her on grass and sticks she laid every few minutes." In a later letter, 5th Aug., Mr. Courtis writes: " I noticed a female Parnassius alight on a piece of Sedum, drop to the ground, climb up and lay an egg either in the leaves or the roots or on the ground. I could not find the egg, and yet I saw her go through the motion of laying. The only ones flying round are broken, and few of these." On 4th July, Mr. Courtis had written: "A few days ago I took a walk, and saw hundreds of the Parnassius, and caught, 10 or 12, but they were all males except one, which was so injured that it died. To-day I went to the mountains and took 40 or 50,and have several of them tied up in netting with Sedum. *One pair have mated*, so that I hope to send you some eggs. The season is very short. I think all the butterflies come at one time, like the flowers. Spring and fall flowers are only a week or two apart here. The females of these Parnassius are much harder to find than the males, as they are hid in the grass." On July 8th: "I went out this morning and took 20 or more pairs,and watched the females. They all seem to fly to the ground, and either lay on the ground or in the grass roots. I could not find the eggs, though I saw them drop them somewhere among the dry sticks. I have a large number now tied up, but they will not lay. Some which were tied up, on being let loose, laid at once on grass and anywhere. This species is very common, hundreds of it on every hill-side." Again: "The Parnassius come about 1st July, and now, 28th July, have almost entirely disappeared. The Sedum is the most common flower on the rocky hills."

Mr. Mead, in 1878, when in California and Nevada, obtained numbers of eggs of *P. Baldur* and of *Smintheus*,by shutting the females up with Sedum. On three several occasions I have had caterpillars of one or other of there species hatch here at Coalburgh,in last days of winter, but have lost all of them. They were supplied with Sedum leaves, but refused to eat. I thought they might require the flowers when first hatched, and shall endeavor to retard the hatching of the eggs I now have till I can give them Sedum in flower. But G. M. Mollinger writes me that the eggs of *P. Apollo*, in Switzerland, hatch late in the fall, and the young larvae hybernate; awaking in early spring, and eating the leaves of Sedum. not the flowers. It is certain however that our species do not hatch till spring, the eggs hybernating. Both Mr. Mead and myself have carried the eggs into mid-winter, or through the winter. with no artificial retardation. It is probable that the larvae come forth as soon as the snow melts, feed on Sedum, and mature about middle of June, then remaining in pupae till early in July.* The newly hatched larvæ are singular creatures, bearing no resemblance to any members of the Papilionidae which I have ever seen. They are thickly studded with small tubercles in rows, and each of these gives out several short curved black hairs. They look something like caterpillars of Argynnis but are very different from these also. I do not think. judging from the egg and young larva, as I know them, and by the mature larva and chrysalis, as figured in books, that Parnassius has any right among the Papilionidae. Under a system in which the preparatory stages were considered, and in the future we shall have to come to that, it would stand a long way from the Papilionidae. The

---

*See But., N. A., vol I, for Mr. Mead's remarks on habits of *Smintheus*, as observed in Colorado, in 1871. I also quote remarks by Schaeffer, who believed the larvæ of *Apollo* hatched in the Spring. Also authors on the pouch at end of abdomen of female. Von Siebold thinks it must be formed during copulation; Schaeffer says it was on all the females bred by him.

egg of *Smintheus* is like Lycaena, of *Baldur* like Chrysophanus ; the young larva like some Nymphalidae (and perhaps Erycinidae); the mature larva more like a Heterocerous moth (in all but the tentacles); and the chrysalis like a Hesperian, or also perhaps some moths. However till more is known of the biology of the genus, it may be premature to speculate on a proper arrangement.

5. ANTHOCHARIS JULIA, Edw.
6. PIERIS OCCIDENTALIS, Reak.
7. COLIAS EURYTHEME, Bd.
8. " EDWARDSII, Behr.
9. " SCUDDERII, Reak.

10. ASTRÆA, Edw. This species was described from a rubbed or broken male brought in by the Hayden Expn:, from the Yellowstone region, a dozen years ago, and till now I have seen but one or two others, from same region. But Mr. Courtis took 4 good males. The upper side in fresh examples orange ochraceous. The under side shows that this species belongs to the *Alexandra* group, the discal spot of secondaries being white (pearly) without a ring, but with slight rosy edging; also there are no submarginal brown spots to either wing, and no patch at outer angle of secondaries,—all which points are also characteristic of *Alexandra*.

II. COLIAS HAGENII, new species.

This form is very common in the Rocky Mountains from Colorado to B. Am., and is between *Philodice* and *Eurytheme*. Mr. Mead brought it in 1871, and agreed with me at the time that it could not be *Philodice;* but till this year there has been no opportunity to get at the preparatory stages, the only test where closely allied forms are in doubt. Mr. H. W. Nash, of Pueblo, Col., early in the summer, sent me some chrysalids of this species, and I noticed that the dorsum was marked by two longitudinal yellow lines, which seemed to indicate similar lines in the larva, and which are not present in the chrysalis of *Philodice*. I wrote to Mr. Nash to observe as to that, and he soon replied that the larvae he then had on hand did show sub-dorsal lines (such as are characteristic of many larvae of C. *Eurytheme*.) Great numbers of eggs were sent me again and again by Mr. Nash, during July and August, but in crossing the heated plains they lost their vitality, and soon after I received them, collapsed without hatching. Also, several shipments of larvæ were destroyed by same cause. But since middle September eggs were sent which hatched en route, and I now have about a dozen larvae just past the second moult. These will probably hybernate before reaching another moult. But Mr. Nash has made observations on the ground at my request, and has sent me larvae in alcohol, showing broad sub-dorsal bands, which, he states, had, in life, *red running through them*. In the alcoholic specimens the red has passed away, but the white bands are distinct as ever. Other larvae were sent showing white lines only, and Mr. Nash says no red was present in these. Still others have no trace of a sub-dorsal band, and are like *Philodice*. The same variation appears in *Eurytheme* larvae, as may be seen by reference to the plate of that species, in vol. 2, But. N. A., where larvae, banded and not banded, stand side by side Some *Eurytheme* also have sub-dorsal lines instead of bands, without red. But, in *Eurytheme*, the *red is not within the band, but over* it in broken bits, and under the bands are often black points. All Colias larvae are very much alike, being uni-colored and the longitudinal bands, when present, afford the best possible characters for distinguishing the species. *Philodice* I have often bred from the egg, and I raised two broods of larvae this summer, and no example has ever shown a sub-dorsal band or line. From banded larvae Mr. Nash obtained chrysalids, which were sent me, and gave butterflies here, *Hagenii*. Mr. Nash says, August 21: "I send you 4 larvae of the Colias. Three of them have a sub-dorsal line, the other has none. Out of 24 nearly full-grown larvae that I have, 14 have the sub-dorsal line." Again; "I send you a chrysalis from the caterpillar I wrote you of, as having a sub-dorsal stripe of white and red. It changed yesterday." All these chrysalids, from caterpillars with and without sub-dorsal bands, I received, and they gave imagos, all same species, C. *Hagenii*. Again, Mr. Nash writes, 24th August: "I have two larvae about to pass 4th moult that have the sub-dorsal bands very distinctly marked." On 28th: "I send one of the larva of which I wrote you, in alcohol, past 4th moult, with wide sub-dorsal lines and red running through them; the other is marked in same way, except that the lines are not quite so wide. I will send the chrysalis in a few days." This chrysalis was received and produced *Hagenii*. I give below a description of this species:

12 ARGYNNIS LETO Behr.
13 " APHRODITE Fab.
14 " CORONIS Behr. This species flies from southern California to B. Am.
15 " EDWARDSII Reak.
16 " EURYNOME Edw.
17 " var. ERINNA Edw.
18 " MONTICOLA Behr.
19 MELITAEA PALLA, Bd.
" HOFFMANNI, Behr.
20 PHYCIODES THAROS Drury.
21 VANESSA ANTIOPA Linn.
22 GRAPTA SATYRUS Edw.
23 " ZEPHYRUS Edw.
24 " SILENUS Edw.
25 LIMENITIS WEIDEMEYERII Edw.
26 SATYRUS NEPHELE, var. OLYMPUS Edw.
27 COENONYMPHA OCHRACEA Edw.

28 Erebia Epipsodea Butler.
29 Chrysophanus Mariposa Reak.
30 " Helloides Bd.
31 Lycaena Phileros Bd.
32 " Saepiolus Bd.
33 " Acmon Doubl.
34 " Lycea Edw.

DESCRIPTIONS OF NEW SPECIES.

PAPILIO NITRA.

Belongs to the *Asterias* group, and stands next *Indra*; costal margins of primaries in both sexes much bent near apex; hind margins in both convex; tails long, narrow, tapering; *the two sexes alike in markings.*

Male.—Expands 3 inches.

Upper side black, spotted and banded with light yellow, the submarginal spots of primaries rounded next apex, the rest ovate; of secondaries semi-circular, the two next inner margin lunate; the discal band composed of separated spots, which are long, the upper 5 lanceolate, the others truncated, and not clearly defined on basal side; these spots resemble in shape the corresponding spots in P. *Bairdii*, but all are square-edged on outer side; on secondaries the band is also composed of separated spots, and covers about one-fourth the cell; above the incision at anal angle is a pale orange ring on yellow ground, inclosing a round, black spot; on the black ground beyond the band are loose clusters of blue scales entirely across the wing, those next inner margin scarcely more dense than elsewhere. Under side pale black, the markings repeated, pale; the extra-discal area on secondaries dusted lightly with yellow scales, and above them blue scales about a rather dense nucleus in each interspace. On the spot at outer angle is a faint tint of orange, and so also on the outer end of the two spots of the band in median interspaces; the anal ring deep orange fulvous.

Body black, the wing covers all yellow; the abdomen wholly* black, except for a slight lateral stripe; legs black; palpi black; frontal hairs black, at the sides yellow; antennae and club black.

Female.—Expands 3.3 inch.

Spotted and banded like the male, but the five upper spots of the band on primaries are sub-ovate; the yellow throughout is paler; under side without orange, except in median interspaces.

From a single pair taken in Judith Mtns. Mr. Courtis wrote me that

---

* In the description of *Indra*, Part VII. vol. 2. But., at bottom of first page, for "the abdomen *white* without yellow," it should read "the abdomen *wholly* without," &c.

he saw several at the same time but not knowing that they would be of any especial value, he took only the two. The species will be found abundantly in some parts of Montana, and probably in Brit. Am. It lies between *Indra* and *Brevicauda*. The latter has the abdomen marked by rows of yellow spots, subdorsal and lateral (4 in ♂ 6 in ♀), as in *Asterias*. *Nitra* has only a lateral stripe running from base of wing to last segment. *Indra* has not even all of this, but the stripe is restricted to the two segments before last. In *Indra* the spots of mesial band on hind wing are run together, and the band is square-edged on basal side; in *Nitra* the spots are widely separated, and the inner edge is not straight, and is shadowy, as in *Bairdii*. The species is very distinct. As the allied species has been named *Indra*, I call this *Nitra*, another appellation of "the Shining One."

COLIAS HAGENII.

Male.—Expands 1.5 to 2 inches.

Upper side pale sulphur yellow, sometimes with an ochraceous tint throughout; the marginal borders broad, erose within, cut nearly to outer edge by the yellow nervules; discal spots of primaries small, suboval, black; of secondaries, bright orange; fringes pale roseate, yellow about inner angle of primaries and outer of secondaries. Under side pale yellow, very slightly dusted over costal margin of primaries and all of secondaries with fine dark scales; discal spot of primaries double-convex, black, with white or yellow inside, on which are a few rosy scales; a sub-marginal series of brown points, but often none at all; discal spot of secondaries pearl-white, with a few roseate scales (sometimes the spot is all roseate), in pale ferruginous ring, sometimes duplex; at outer angle a slight patch, often a mere streak of reddish; a submarginal series of rosy or reddish points, often wholly wanting; at base a small roseate patch.

Female.—Expands from 1.6 to 2 inches.

Upper side green-yellow, more often a deep yellow, running towards ochre, and orange-ochre; of 24 examples now under view, 14 have this deep yellow hue decidedly; the marginal borders of both wings very broad, on primaries enclosing a series of large, yellow, well-defined spots, wanting in upper median interspace; on secondaries this border extends from one angle to the other, and is broad enough to nearly enclose a series of yellow spots; in others the border but partially encloses the spots, which therefore are not defined; occasionally the border is narrow (2 instances out of 24), and one example shows merely a sprinkling of black scales about outer angle. The under side is either pale yellow or greenish over secondaries and apical area of primaries, and the markings are variable as in the male. From 20 ♂ 24 ♀ from various localities, from So. Colorado to Montana and Dacotah (Bismarck).

This species is nearer to *Eurytheme* than to *Philodice*, in the imago as in the larva. The broad border of hind wing, enclosing yellow spots, is a usual feature of the former, but very rare in *Philodice*. Add orange and *Hagenii* would be indistinguishable from *Eurytheme*. This struck Mr. Mead, when collecting in Colorado, and he wrote me then; "if there can be a yellow *Eurytheme*, this is it."

C. *Hagenii* is also close to C. *Eriphyle*, a common species in Br. Columbia. At the end of my description of *Eriphyle*, Tr. A. E. Soc. V. 1876, I said: "Mr. Mead brought from Colo., in 1871, a Colias very close to this from Lake Lahache, and which in Mr. Reakirt's paper on the But. of Colo., Pr. E. S. Phil. 1867, p. 14, is doubtless the one called *Philodice*. The same form was brought from Montana by Dr. Coues, when engaged on the Boundary Line Commission. For the present I shall give no opinion as to these, but they seem to me nearer to *Eriphyle* than to *Philodice*." The species spoken of is *Hagenii*, and I now see that it lies between *Philodice* and *Eurytheme*, the four species making a sub-group.

I name this fine species, conquered by the bows and spears of Mr. Nash and myself, in honor of our distinguished Neuropterist, whose recent zeal in a new field, to wit, the N. A. Lepidoptera, has been the admiration of all beholders. We have established it on a sure foundation by breeding from the egg, and I respectfully commend this method of determining the position of doubtful species to Dr. Hagen.

COALBURGH, W. VA., October 1, 1883.

CAPITALIZING SPECIFIC NAMES.

BY C. V. RILEY.

There could scarcely be greater justification for the inquiry on p. 62, of this volume, as to the reason for the uniform capitalizing of specific names than the temper of the answer given by Mr. Wm. H. Edwards on pp. 103-5. My question, while somewhat obscured by typographical errors, subsequently corrected, was a simple one and has not yet been satisfactorily answered. Mr. Edwards in his reply tries hard to be facetious, but instead of bringing forward any valid defense of the custom, would dispose of it by the assertion that "it is the only proper thing to do!" Let us see what are his grounds for this assertion? Mr. Edwards has not been very accurate in his quotations from my inquiry, especially in the closing paragraph, and he misapprehends my point if he supposes that I have any objections to the proper use of capitals for specific names in accordance with the well known and generally accepted rules of the Latin language, which would include all proper nouns. My objection is to the uniform use of such capitals, whether the specific name be a common one or in the adjective or genitive form. The fashion is peculiar to Lepidopterists, and I hold that it is comparatively recent and that it is improper and unjustifiable. My reasons for this belief are:

1. The rules governing the popular designation of individuals are different from those adopted for the technical designation of genera and species; for while we write "John Brown," we as invariably write

Homo sapiens. But if Mr. Edwards wishes to make the comparison he will find it more apt in "faithful Miss Smith" or "John Smith's book" than in "Miss Faith Smith."

2. Linnæus and Fabricius were rather free in their use of capitals, as in some plant and locality names in addition to proper ones; but they were by no means universal capitalizers; whereas all the latter writers whom Mr. Edwards quotes, as Kirby, Staudinger, Hewitson and Felder are modern authors. In this country Mr. Edwards stands almost alone, his only constant company being Mr. Herman Strecker, though the fashion seems to be growing, and has been followed of late by Mr. G. H. French and Mr. A. R. Grote. Mr. Edwards will have difficulty in citing any good authorities in any branch of science, much less in Zoology, who have followed, or do now follow the fashion, and I cannot recall a single entomologist—Lepidopterists excepted—who has or does. The large majority of Lepidopterists, in fact, do not, which is strange if "it is the only proper thing to do!"

No one at all familiar with scientific nomenclature, in any department of research can doubt that since Linnæus's time the tendency—always except among certain Lepidopterists—has been more and more against the free use of capitals for specific names; while the custom of writing all specific names with a small letter is rapidly gaining ground* a result due, without much doubt, to the fact which I stated, viz: that it always permits the distinguishing of the generic from the specific names in articles where either are used singly—a desideratum which no one who has followed the writings either of Mr. Edwards or of Mr. Grote will fail to appreciate. Believing that this custom has many advantages I have lately adopted it. Uniformity of termination in scientific nomenclature for equivalent divisions is desirable, and rules so far formulated have had this as one of the objects to be attained. Uniformity of beginning in generic and specific names is equally desirable.

Mr. Kirby very courteously gives the only approach to a reason for the custom which I criticize in that in lists of species "the capital initial letter catches the eye so much more readily than small letters." In lists of species where every line may be considered a new sentence, the initial capital is justifiable; though where they follow a genus, as in most lists and catalogues, a repetition of the genus is implied and the lower case letter is preferable. I can scarcely agree with Mr. Kirby and do not find *e. g.* that the recent Brooklyn List of Lepidoptera, or Mr. Grote's latest List (where capitals are uniformly used) have any advantage in perspicuity over the latter's earlier lists (where small letters are used according to the ordinary rules), or Mr. Fernald's catalogue of Tortricidæ (where small letters are uniformly used except in quotations). These last lists are in every way preferable, both for neatness and the saving of space. It is doubtful whether the prodigal capitalizers in America have been influenced by the reason Mr. Kirby urges. The fashion is rather an unconscious development of the legitimate capitalizing of so many butterfly names taken from mythological or other proper personages, coupled, perhaps, with the childish idea that the capital gives more importance to the name.

---

* **It is already adopted by some Lepidopterists even, as Walsingham and Fernald.**

Mr. Grote's reply to my inquiry is characteristically off the point. I have never used the word "immoral" in reference to his lists. I have argued against, and spoken in general terms of the moral objection to, the custom of quoting the authority for the latest generic and specific combination for an insect, and the fact that Mr. Grote, among others, has abandoned the custom, leads me to hope and believe that he will yet abandon the habit of extravagant capitalizing, and conform to common usage among scientific men.

OBITUARY NOTICES.

JAMES SPENCER BAILEY.

This well-known and respected entomologist passed out of his earthly life on the first of July last, in Albany, N. Y., which city had for many years been his home. He was born in Bethlehem, N. Y., on the 25th of January, 1830, and was therefore only 53 years of age. He was educated chiefly in his native State, and commenced the study of medicine under Dr. John Swinburn, graduating from the Albany Medical College in 1853. Soon after this event he married Miss Fanny Keith, of Augusta, Ga., and began to practice medicine in conjunction with his brother-in-law, Dr. Thomas, at Cusseta, Ala. In 1859 he went to Mobile, and very soon afterwards to Hempstead, Texas, where he spent a number of the most active years of his professional life. During the war he served for over a year as a surgeon in the Confederate army, returning to Albany at the close of the close of the strife, and remaining there until his death. In 1869, he had conferred upon him the honorary degree of Doctor of Medicine, by Soulè University, of Galveston, and in 1874, he was honored by Hamilton College with the degree of Master of Arts. He was also chosen President of the Albany Medical Society, and was long one of the chief editors and compilers of the transactions of that body. He was widely interested in all subjects appertaining to Natural History, and many papers from his pen, on various interesting questions are to found in "Forest and Stream," the "Country Gentleman," and other journals, while his articles on matters relating to his own profession are numerous and well-written As an entomologist, he was chiefly known by his excellent articles on *Cossus Centrensis* and *Ægeria pictipes*. His collection, principally of Sphingidæ and Catocalæ was extensive, and probably second to few in this country. He possessed a rare enthusiasm for his favorite science, and to use the words of one of his biographers, "he had a mind above the question of money-getting, and loved to work on those things which inform the mind, and develop the orderly beauty of nature." It is most earnestly to be hoped that his various papers may be collected and published in some permanent form. The editor of the "Medical Annals," Albany, July, 1853, thus speaks of our departed friend: "It is not a common-place man that has gone from our roll of active membership, but one who was larger than the ordinary—larger not only in mental capacity, but also in worthy ambitions, in appreciating the things that are worth living for, and in kindly regard for his fellow-men."

H. E.

TOWNEND GLOVER.

Professor Townend Glover, so long connected with the Government in the capacity of Entomologist, died at the house of his adopted daughter, Mrs. Daniel Hopper, in Baltimore, Sept. 7th, from an attack of apoplexy. His most intimate friends know comparatively little that is exact concerning his early life. He seems to have been born on the ocean near Rio Janeiro, of English parents, as near as we can find out, in the year 1813, so that at the time of his death, he had entered on his seventy-first year. From the most trustworthy statements it seems that he was taken to England, while yet a child, and received his education there and in Germany. He came to this country as a young man, and finally settled at Fishkill, on the Hudson. It was during his residence at Fishkill that he first became connected with the Patent Office, and we find his first recorded work on Entomology in the Agricultural Report for 1854. He subsequently accepted a position in the Maryland Agricultural College as lecturer on Natural History, and remained there until he was appointed Entomologist to the present Department of Agriculture in 1862.

Mr. Glover had many personal peculiarities and one of his humorous boasts was that he was born in no country and never named an insect. His early work shows him to have been an excellent observer, and some of his reports are models of careful and painstaking work. This is especially true of his reports on insects affecting the cotton plant in the United States. He was most ready with his pencil, and had a positive genius for modelling fruits and mounting birds. He was the founder of the present museum of the Department of Agriculture.

His chief work in Entomology, aside from the numerous annual reports which he prepared as Entomologist to the Department, was the preparation of a large number of copper-plate engravings (287 in all,) of insects, with an immense number of collected notes. These plates, especially the earlier ones, are admirable illustrations of most of the commoner insects of the United States, and their transformations, and it had always been his intention to issue them as a complete work on North American Entomology. They not only represent many original drawings from life, but copies of a great many figures by other authors. Thus many figures from Smith and Abbott, Boisduval and Leconte and Ratzeburg, are reproduced. In time the same insect often came to be repeated on different plates, and the work evidently grew beyond the author's anticipations when it was conceived. In the preparation of these plates he showed an enthusiasm and an industry almost phenomenal. Some of them have been published in limited editions, as "M.S. Notes from my Journal—Diptera;" also with similar titles, the plates and notes on Hemiptera, Orthoptera, and on the Cotton Plant and its Diseases. The plates of the remaining orders have been circulated among a few of his friends, but there are but fifteen full sets in existence. The plates with the notes were purchased a year ago, by the Government for $7,500, and are now deposited in the National Museum under the care of Prof. Baird.

It is doubtful whether any entomologist will ever care to take the responsibility of editing and revising this unfinished work, but the plates and notes, just as they are, ought to be published in limited editions by the Government and distributed to educational institutions and libraries throughout the country.

C. V. R.

VICTOR TOUCEY CHAMBERS.

Entomologists will learn with deep regret of the death of V. T. Chambers, at Covington, Ky., on August 7th—his fifty-second birthday. He was a lawyer by profession, and yet found time to do a great deal of entomological work. His writings have been confined almost exclusively to the Tineidæ, and all of his earlier papers wese descript tive in their character and were published mainly in the "Canadian Entomologist."

His later writings, published in "Psyche" and the "Cincinnati Quarterly Journal of Science," dealt largely with the larval structure of the Tineidæ. In addition to these various articles, he published in Bulletin 1, Vol. IV., of the United States Geological and Geographical Survey, a list of "Tineina and their food-plants" and an "Index to the described Tineina of the United States." His collection was some years ago deposited with the Cambridge Museum of Comparative Zoology, and duplicates of many of his types are in the possesion of private individuals.—*From American Naturalist.*

JNO. L. LECONTE, M.D.

This distinguished entomologist, and most estimable man, died at his residence in Philadelphia, Nov. 18, 1883, at the comparatively early age of 58 years. In him the world has lost an earnest devotee of science, and those who knew him best, a warm-hearted, affectionate and sympathizing friend. He commenced the study of natural history while little more than a boy, his taste for such pursuits being encouragingly fostered by his father—himself a distinguished naturalist—and the collaborator with the late Dr. Boisduval in the "Lepidoptera of North America." Many other members of his family are of great eminence in the scientific world, two of his cousins, Drs. Jno. and Jos Leconte (the latter a well-known geologist,) holding high positions in the University of California. Dr. J. L. Leconte, whose death we have now to deplore, made a special study of the Coleoptera of this country, and his writings upon his favorite branch of entomology, are both numerous and valuable. A full list of them, numbering over 150 papers, was published about four years ago by "Psyche," and more recently by the Bull. Brooklyn Ent. Soc. It has been suggested that the whole of these papers, many of them now exceedingly scarce, should be collected and republished in a permanent form. Such a work would be hailed with joy by entomologists throughout the world. It is understood that Dr. Leconte's magnificent collection of Coleoptera, so precious for the number of types it contains, has been bequeathed by him to to the Museum of Comparative Zoology at Cambridge. The many who loved him and sorrow for his loss, may find consolation in the spectacle which he presents of a life well rounded, without reproach, honest, true and generous in all its details, and filled with devotion to whatever end was before him, of one who lived his allotted time without an enemy, and who passes to his rest with the affectionate regret of many grateful and loving friends.

H. E.

COMMENTS ON A PAPER ENTITLED "THE GENUS COLIAS,' FROM PROC. BOST. SOC., N. H., VOL. XXII.

By W. H. Edwards.

In Papilio III, March, 1883, I replied to Dr. Hagen's first paper, "Portion of a preliminary report on the Butterflies of Washn. Terr.," and proved that he was altogether at fault with regard to P. *Zolicaon* and *Oregonia;* that they were not varieties of P. *Machaon* or of each other, and that *Zolicaon* did not even belong to the same sub-group with *Machaon*. I had said enough about the distinctness of P. *Rutulus* from P. *Turnus*, also claimed by Dr. Hagen to be varieties of one species, in a previous paper, which appeared in the January No. of same volume of Papilio, and am prepared to-day to demonstrate from the larval stages that these two species are distinct, as I have bred larvæ of *Rutulus* from the egg on a pretty large scale the past summer. But as I shall devote two Plates in Part XII. But. N. A. to *Rutulus*, I need say nothing here of that species.

The argument in this Colias paper follows the same line as that laid down in the *Machaon* paper spoken of; namely, that where two or more forms, called species by some authors, show resemblances, where one or more characters are common to them all, these so-called species are really but one species. Whether each is permanent to-day, breeding true to its own type, so far as there is knowledge of it, wholly dissevered from its next ally in the series, does not enter into the estimate. Whether there are larval differences is a matter of no consequence; if there is resemblance, it shows not community of origin, that being ignored altogether, but derivation. One of these forms is assumed to be derived from the other, and if there be several, all are derived from one. The derivation can in no instance be proved, and in some cases presupposes a state of things which not only does not exist, but in all probability never can have existed. All the same, resemblance is identity. In this way, what other naturalists call a subgroup, a group or a genus, resolves itself into one species and its derived forms; and the parent form is the one which happened to be first described in the books.

Now, I undertake to say that this mode of treating species, though it might have answered fifty years ago, is not satisfactory to-day. The vast majority of naturalists see in resemblance not necessarily identity, but community of origin; they hold that all the species of the same genus are descended from the same progenitor; that intermediate forms between strong varieties descended from a common progenitor tend to become extinct, being absorbed by the stronger forms; that permanence and breeding true to type are proper characters by which to determine what is a species; that species inheriting nearly the same constitution from a common parent, and exposed to similar influences, naturally tend to produce analogous variations; or that the same species may occasionally revert to some of the characters of their ancient progenitors. That is the teaching of Darwin, and to refuse to admit it is as if one should refuse to admit the truths taught by Copernicus.

Every person interested in these questions should read the address by Dr. Asa Gray, "on Sequoia," published in his volume of addresses and essays, entitled "Darwiniana" (Appletons, 1876). In this it is shown how distinct genera of plants are represented by closely allied species, perhaps in very small numbers, in widely distant parts of two continents. In one genus mentioned there are three species only, one of which is found in Florida, one in California, one in Japan. In another, four species inhabit Atlantic N. America, California and China. In another case, the single species of a genus, inhabiting a limited district of the Alleghanies, "finds its only and very near relative" in a single species of another genus in Mantchooria. I do not find, by the way, that Dr. Gray gives these related forms any lesser rank than species. On the Hagenian system, in each case the allied species would be looked on as so many derived forms, derived one from the other, and as Dr. Gray shows farther on, this would be impossible. His explanation is as follows: In remote geological ages the circumpolar regions had a warm climate; vegetation was very like what it is to-day in the temperate zones of both continents. This is proved by the fossil trees and plants which are preserved in the present arctic regions, with characters so distinctly marked as to be capable of identification. The conclusion of Lesquereux, quoted by Dr. Gray, is, that the essential types of our actual flora are marked in the cretaceous period, and have come to us without notable changes through the tertiary formations of our continent. And Dr. Gray says for himself: "I, for one, cannot doubt that the present existing species are lineal successors of those that garnished the earth in the old time before them. The glaciation of the north temperate zone, following the warmer period, pushed the species southward, upon widely different longitudes. Hence the diffusion of the same species over two continents." And he adds, that "this hypothesis supposes a gradual modification in different directions, under altering conditions, at least to the extent of producing varieties, sub-species and representative species, as they may be variously regarded."

Now this applies to butterflies as well as to plants, and I propose to apply it to a very interesting group, which shall embrace, of the new world species, *Philodice*, *Eriphyle*, *Hagenii* and *Eurytheme;* in the old world, *Chrysotheme*. Other species may be, and no doubt are, in direct descent from the common progenitor of the five, but these form so compact a sub-group that they may be studied by themselves to advantage. In one continent, *Chrysotheme* represents the ancient species; in the other continent, *Eurytheme*. This last presents itself in three distinct forms, or in other words, the species is tri-morphic, while *Chrysotheme* presents but a single form. It has its variations, of course, as does *Philodice*, for example, but these have not separated into defined seasonal forms. Of the three forms of *Eurytheme*, one appears in winter or early spring, according to the latitude, *Ariadne ;* the second succeeds it in late spring, *Keewaydin :* and the third is the summer form, *Eurytheme*. The first is small, with a minimum of orange, and that pale; the second is larger, with orange deeper and covering a larger part of the surface; the third is very large, and the orange covers the whole surface, is intense and often iridescent. *Keewaydin* most approaches *Chrysotheme*, and Dr. Hagen assumes as a matter of course that it is *Chrysotheme*, neither more nor less, which from its territory in south eastern Europe—Austria at the nearest, has jumped over the longitudes, first to the Atlantic, then across that ocean, and popped down in the interior of the Western Continent, hundreds of miles beyond the seaboard, as if it had crossed in a balloon, and been dropped like a sand bag; here it has then taken possession of the Mississippi Valley and westward, and has in course of its American sojourn and travels, developed, the doctor says, both backward into a winter form and forward into a summer form, which he has to concede are distinct from anything seen in the territory of *Chrysotheme* at home. Neither *Chrysotheme*, nor any form of *Eurytheme*, inhabits the boreal regions of either Continent, and *Eurytheme* is scarcely known in British America, even. Therefore for one to have been derived from the other, or for the two to be the same thing, as I said before, presupposes impossible conditions, and is simply preposterous. The reasonable explanation of the resemblance between the two species is this: the common progenitor of both inhabited the circumpolar regions, and by the glacial climate, which followed the temperate, was pushed southward, one branch on one continent, the other on the other continent, and for all the ages that have passed since the parting, no possible connection can have been between the two. Now what is the latest date at which such a parting could have been possible? It must, of course, have been when North America and Europe were connected through the polar regions, and the leading geologists assure us that this occurred during the last glacial period, and that before the close of it, the connection was broken, and finally. The close of the glacial period is set down at 80,000 years ago, its beginning at 240,000, and in the intervening ages all this southward migration of plants and insects took place. And what is the state of things to-day as regards these Coliads? We find *Chrysotheme*, the present representative of the ancient species on one continent, a very constant species, and entirely without defined seasonal forms; we find three forms well-defined going to make up the present American representative of the ancient species. There is resemblance between *Chrysotheme* and one of the forms of *Eurytheme*, but not more than there is between *Philodice* and *Eurytheme*, save in the single character of color. If *Chrysotheme* on a large scale could be introduced to day to America, it would breed true to its own type, and be a constant species just as it is in Europe. It would be ages before it would vary largely and could part into defined forms, and these might vary much from the forms under which we know *Eurytheme*. The only rational explanation is that of community of origin, and in both continents modification has taken place, resulting in well-separated species. Each is true to its own type, has marked peculiarities, and is permanent; and therefore is a species; and the two are species.*

Carrying this explanation a step farther: not only have those two orange species sprung from one ancient species, but the three others before named have come from the same source.† Of these, *Eriphyle* has possession of the Pacific Coast towards the Rocky Mountains, and at least as far south as the United States boundary line; *Hagenii* occupies the Rocky Mountain region from southern Colorado well into British America, and to the east as far as the desert country; *Philodice* inhabits the Atlantic and Gulf States, part of the Mississippi Valley, and part of Canada, but there is no evidence that it has yet crossed the desert belt to the west, or anywhere

---

*Dr. Staudinger, in his Cat. 1871, gives the location of *Chrysotheme* as follows: Eastern Middle Europe, Asia Minor, Armenia, Middle and Eastern Siberia. I wrote Mr. A. G. Butler for any information he could give me. He says, "I strongly suspect it to be a strictly European species. The B. Museum contains examples from Germany only." I also wrote Dr. Staudinger, and he replies, 8th Oct., 1883; "In all the collections I have received in the last ten years from Central and North Asia *there never was one Chrysotheme*. I have only one specimen from East Siberia in my collection, but this was in the large Hopffer collection which I bought. *I have received Chrysotheme only from Southeast Europe*. I never met or received it from Asia Minor. *Chrysotheme* varies, and the first generation is always somewhat different from the second. I received from Lapland some *C. Hecla*, very near to *Chrysotheme*, and it may be the former is the northern form of that species. Also your *Keewaydin* is hardly to be distinguished from *Chrysotheme*, and I have also from your very variable N. Am. species, *Eurytheme*, specimens which are hardly to be distinguished. Perhaps all are from the same species, not connected by Siberia and Japan, *but by the Polar regions, from the time when America and Europe were connected by land*." The last suggestion is in accordance with what I have written in this paper, and is the proper one. I notice that neither Staudinger nor Zeller claim identity between *Chrysotheme* and *Keewaydin*. Staudinger says the former can "hardly be distinguished" from the latter, implying a difference. Zeller says, "I myself have taken a male (*Chrysotheme*) at Vienna with so little orange on the inner half of the wing that a North American could *scarcely distinguish* it among a number of male *Keewaydin*," and adds: "If *Keewaydin* and *Chrysotheme* are really the same species, we may well say that species vary much more in North America than in Europe." Ent. Zeit, 1874.

†It is my opinion that most, if not all, of the present species of Colias, in N. Am., must be more closely related to *Eurytheme* than *Chrysotheme* can be, having probably diverged in successive steps from the glacial form since the parting of the American and European branches. Any resemblance between *Chrysotheme* and *Eurytheme* now would be owing to both having retained some features of the ancient form. All the yellow species of Colias seem to have a tendency to orange spots, and I infer that the ancestral species was orange.

yet reached the Rocky Mountains. It is advancing with cultivation, and the spreading of the plant it feeds on, red clover, as I described in the text of this species, But. N. A., Vol. II. These three differ from their orange allies in color, all being yellow; but they differ among themselves in the hue of yellow. The nearest to *Eurytheme* is *Hagenii*, the next is *Philodice*, and *Eriphyle* stands most remote. That some *Philodice* are like some *Eurytheme* in all respects (in one or several forms,) except color, is apparent to every one who is familiar with the two species. I spoke of it in my text of *Eurytheme*, Part V. Vol. II., But. N. A., and Dr. Hagen quotes me approvingly; "he comes to the conclusion that both species have exactly the same variations and only differ in color." Also, "the larvæ are scarcely, if at all, distinguishable in the earlier stages, and in the later, are often just as much alike.* But in the later larval stages there is a conspicuous difference between *Eurytheme* and *Philodice*, the former having caterpillars, which after the middle of the stage following the second moult, have developed a series of sub-dorsal bands, as thus: on either side, on verge of dorsum, a central white band, sometimes complete and continuous, sometimes macular; over this, a red band, always macular; and under the white, a series of black dots, which may stand for a macular band. All larvæ do not show all these bands, some not having the black, some neither the black nor red, and some have no trace of any of them, and so are not distinguishable from *Philodice*, which never has a sub-dorsal band. These peculiarities are shown on my Plate. The two butterflies, starting from the same point, have developed, one into an orange species, with three distinct seasonal phases, and with a much-banded caterpillar; the other into a yellow species, without distinct seasonal phases, but very variable, and with a caterpillar in which are no traces of sub-dorsal bands.

And in *Hagenii*, we find an intermediate species of a very interesting nature. The color is yellow, lighter than is usual in *Philodice*, but varies in that respect, many being very green, and a large percentage, especially of the females are not yellow, but of a peculiar shade, a sort of buff-yellow, a shade not seen in *Philodice*. Considerably more than half the females as reported by Mr. H. W. Nash, of Pueblo, Col., who has paid great attention to this form, are of this buff yellow, and the males frequently show more or less of it, and occasionally have a flush of orange. The markings of *Hagenii* resemble those of *Eurytheme* and *Philodice*, in the discal spots, the extra discal points on both wings, the patch at outer angle, the shape of the black borders; but there is a closer resemblance in the borders of many of the females to *Eurytheme* than to *Philodice*, these being very wide, and on hind wings nearly reaching the cell, completely enclosing more or less definite yellow spots. Mr. Mead agreed with me twelve years ago, after passing the whole summer in Colorado collecting butterflies, that this form could not be *Philodice*, and then said, that "if there could be such a thing as a yellow *Eurytheme*, this was it." The larvæ differ from *Philodice* very much, and differ also from *Eurytheme*, in important respects. A large proportion show the sub-dorsal white and red bands, but none the black, and the white band is not macular but continuous, and *inside it*, *not over it*, in the continuous red line.

---

*The eggs of all species of Colias far as known, are same shape, spindle-shaped, ribbed vertically, and so alike that I doubt if any two species can be distinguished by that stage; the young larvæ and generally up to second moult, are almost or quite precisely alike also; after that, if there are larval differences, they manifest themselves in variety of bands or spots, the general shape and color remaining closely alike in all species to maturity; and the chrysalids all have same form. This shows community of descent.

Eriphyle we do not know in its larval stages, but it differs from all the others in several points; it is also of a peculiar yellow, canary not sulphur nor buff; on under side reddish, and almost destitute of extra markings, often having no trace of them; is without the patch at outer angle; and the discal spot of hind wings below is pearl-white in a roseate ring. On upper side this spot is always deep orange. Dr. Hagen, p. 168, takes for his standard my description of and remarks on *Philodice*, wherein I show that the markings of that species are variable, and he claims that "all species which are characterized by differences falling in the wide range of those given in that paper "must be united with" *Philodice*.

The range of variable markings mentioned would cover nearly or quite every known species of Colias in one way or other. It certainly would include nearly all the characters found in *C. Eurydice* ♂; and the larva of that species in all stages is near to *Philodice*—by no means so separated as is the two-banded larva of *Hagenii*. I know this, for I have bred *Eurydice* from the egg largely the past summer. Yet this species is put by some experienced lepidopterists in a separate genus, and those who do not admit this put it in a separate group. The markings of *Eurydice* ♂ show that it sprung from the same source as did *Philodice*, though perhaps a little more remotely, and the curious "dog's head" mark common to *Eurydice* and *Cæsonia*, not unfrequently breaks out in *Eurytheme*, and occasionally a *Philodice*. This is positive proof of community of descent.

And now I should like to ask Dr. Hagen how it happens he did not "unite" *Eurytheme* with *Philodice*. He declares that it shows all the marks of *Philodice*, and in his comments on *C. Christina*, p. 163, makes light of orange as a color, because Scoresby, in 1822, found an example of *Palæno* in East Greenland which had a tint of orange! and Moschler among hundreds of *Pelidne* from Labrador, says he came across one orange example, and W. H. Edwards speaks of an orange *Philodice*. (About one example in ten thousand may have a tint.) It seems to me that my ingenious friend should unflinchingly have carried his theory to its logical conclusion, and have "united," as he calls it, *Eurytheme* and *Eurydice*, and a number of these species with *Philodice*.

At the end of the paper we are treating of the Doctor gives us a postscript to tell us that Mr. Keferstein, the well-known veteran of lepidopterologists, has published a paper on Colias," etc. That he gives a full classification of the Colias of the whole world. And lower down on the page, says of his classification, "*Eurytheme is not united with Chrysotheme;*" as I should expect from a man of such standing as Mr. Keferstein.

From this statement, any one concerned in these things can discover that Dr. Hagen and I are looking on opposite sides of the shield. I see in all species of the same genus, in the present case, in all Colias, derivation from a single ancient species. In course of ages, under altering conditions, in many climates, different colonies have settled here and there throughout the broad continent; have acquired certain decided peculiarities; the intermediate links between these colonies have been lost, mostly by absorption into the strong forms; these are plainly now breeding true to their own types, and have all the characteristics of separate species.

In Dr. Hagen's view, these colonies can never separate; all the forms sprung from one original type, form, or species, must be "united with it," and altogether are neither more nor less than one species, just as the varieties of *Philodice* are all still *Philodice*. So all the many species, which, as he says, "are characterized by differences falling in the wide range" of what any given species may present "must be united with it." Even in the American Coliades, under the statement of his own views, the Doctor really ends by making nine distinct species, much to my astonishment. That is to say, nine centres of creation in N. America alone!

After having stated the radical difference which exists between the views held by Dr. Hagen and post-diluvian naturalists generally, in which category I include myself, it is hardly necessary to follow this Colias paper further. The same error runs through every page of it. But I will endeavor, as briefly as I may, to notice the Doctor's comments on certain species. The paper leads off with *C. Edwardsii*, a species described and figured by me in 1870, after the MSS. name given it by Dr. Behr, one of the acutest lepidopterists we have had in this country, in honor of Mr. Henry Edwards. It is used here as a sort of decoy for tolling nearly all other species, and passing them over to *C. Interior*. At the end of the farce it is *Interior* which gets off with the swag. At first the whole 129 examples are *Edwardsii*, in the interval between the acts they are this and that, but at the end every fellow of them is *Interior*. These 129 examples appear to comprise every Colias taken on this memorable foray (see page 152), and my positive friend assumes that the 83 ♂ and 46 ♀ are *Edwardsii*. That is a remarkable catch. *Edwardsii* has hitherto been one of the rarest of Colias, but that in any spot in W. T. it should be taken by the hundreds, in a colony apart from any other species, is wonderful!

Some of these *Edwardsii*, however, our author says, he cannot distinguish from *Alexandra*, some from this species some from that. *Alexandra* was described in 1863 and figured in 1868. Both these species stand in same volume of B. N. A., and if, as the doctor says, "*Alexandra* and *Edwardsii* belong to one and the same species," I do not see how he knew which was one and which the other, out of his 129 examples, and why *Alexandra*, as the eldest, did not capture the other. The two species at all events are closely related, and I should not be at all surprised if breeding hereafter shows that they are forms of one species, perhaps seasonal. So far, however, we have no knowledge except what may be got from the dried insects. The under side of *Alexandra* is of a delicate gray-green, and the discal spot is small and white without a ring, the fringe of upper side is yellow. In my volume 1, I will allow that this species has had less than justice. The sexes are both too small, and the upper side of wing of the female is crooked in the printing. One of my copies of this volume, the original edition, has yellow fringes, the other a later imprint of H. M., & Co., by mistake of the colorist, has roseate, which is wrong. It is an oversight I much regret, and I would willingly have the plate redrawn and re-colored at my own expense, and call in defective copies, if that were possible. But the species is now so well known, and so common in collections, that the defects of this plate are of less importance than otherwise they would be. The description should in this case be followed where the figure varies from it.

The typical *Edwardsii* has an orange discal spot on hind wings of female. In both sexes this spot below is in a rosy ring; there is a small rosy patch at base; a much more decided border to upper forewing, and more extended, than appears in *Alexandra*. I never have seen an example of either sex of either of these species in which there was a trace of submarginal spots on under side. It is a point in both species *that they do not have these.* Now, Dr. Hagen tells us that 7 of these 129 *Edwardsii* have more or less of these submarginal spots. The distinctive marks of that species are well shown in the Plate, but the fringes of the male should be yellow as the text declares; those of the female are correct, being rosy. It is possible, as before said, that these species may prove to be seasonally dimorphic. But nothing can determine that before one or both are bred from eggs laid by females in confinement. And till that happens, I shall regard them as distinct.

I doubt exceedingly whether my puzzled friend is really talking about *Edwardsii*. From his insisting that *Alexandra* is *Edwardsii*, and *Emilia* is *Edwardsii*, and *Astræa* is both *Alexandra* and *Edwardsii*, and female *Christina* is *Edwardsii*, and probably the male also is *Edwardsii*, and *Harfordii* is *Edwardsii*, and *Laurentina* is *Edwardsii*, I say after this mixing up of species, how can one have any assurance to how many species these 83 ♂ and 44 ♀ put down as *Edwardsii* belong! In this obscurity I see one ray which affords a little light; "of the six couples collected in copulation, of one the male is *Philodice*, the female *Edwardsii*," p. 155. Now, there never was an example of *Philodice* seen in Oregon or within a thousand miles of it. On p. 170, we read of *Chrysomelas*, which belongs to a sub-group with *Occidentalis*, which last the Doctor puts down as one of the protean phases of *Interior*, "the species must be considered as *Philodice* till more sufficient information is at hand." On p. 174 under *Philodice*, we have as synonymns, "Northwestern forms *Eriphyle* and *Chrysomelas*." So that I am forced to conclude that the doctor found a ♂ ♀ *Chrysomelas* in cop. as was right and proper.

Colias *Christina* is so peculiar a species that no trained lepidopterist can look at it without seeing that as a whole it is unlike any other American species. Its male is yellow, but with great patches of bright orange, not over the surface as in *Eurytheme*, but on the disks of each wing. The female is described and figured in B. N. A., as large, yellow, without border, the under side is exactly as in the male, except that the hue corresponds with that of the upper surface.

Dr. Hagen affects to doubt that this ♀ on the Plate belongs to the ♀ *Christina*, and in several places he makes a point of treating my determination of the sexes of a species as of little value, having "no warrant except that they arrived in the same lot." There were 3 ♂ 1 ♀ of this "lot," received from the portage of Slave River in 1862. Lepidopterists know well enough that as a rule the pattern of the under side of the two sexes in most species, and particularly in Colias, is identical, and mistakes of the kind spoken of can rarely happen. On p. 163, we read "I have 2 *Christina* ♀ collected in Oregon, and W. T., entirely like, the figured one." (How does the doctor know that these, which he next says are *Edwardsii*, are *Christina* ?) "They were collected among the numerous *Edwardsii*, and are entirely pale without a border. As similar ones, with a faint beginning of a border were taken in cop. with *Edwardsii*, there can be no doubt that the females without border also belong to *Edwardsii*." Also, "it would certainly need a stronger proof to consider these males of *Christina* as a separate species, the more so as they are associated with an undoubtedly female of *Edwardsii*." This is a sample of the logic of this paper. The Doctor never saw a *Christina* in either sex, but the female in the Plate has no border a female *Edwardsii* with no border was taken in W. T., and because it has no border it is assumed to be Christina, and therefore the female *Christina* is undoubtedly an *Edwardsii*. Plates are deceiving,and resemblance is not identity. Suppose the Doctor had examined the original ♀ *Christina* which stands in my collection, and had compared it with the females of true *Edwardsii*, which I could have showed him many of!

As to the ♂ we have this lucid observation, "I have not seen *Edwardsii* with such an orange patch, but as similar varieties are recorded for *Palæno* from Greenland by Scoresby,* for *Pelidne* from Labrador by Moschler, for *Philodice* by W. H. Edwards, there is no improbability that some may exist of *Edwardsii*." I call that reading a species out of court by inuendoes, inferences and surmises. Well, in the year of grace, 1883, a host of ♂ ♀ *Christina* have been taken in British America by Capt. Geddes, and I have had the pleasure of inspecting them. And am happy to be able to assure my dubitating friend that the two sexes are really as set forth in my Plate, but that not only are there immaculate yellow females,but there are females with more or less of a border, and with more or less of orange from a delicate flush to a pretty decided hue.

And now a few words as to *Astræa*, which the Doctor sniffs at contemptuously. This was described from a damaged male taken in Yellowstone region in 1872. I afterwards had a second male from

---

In 1822, and a tint of orange, and no other example recorded for the sixty years following. Now, who can vouch for Scoresby, or could swear that he was not talking of *Boothii* or *Hecla* or what not? Indeed, in Ent. M. Mag. XIX., p. 42, is a communication from Dr. Hagen, dated 5th May, 1883, announcing his discovery of Scoresby's mention of this Greenland butterfly, and the Doctor suggests that what Scoresby called *Palæno* may have been *Hecla glacialis!* Just so.

same region. The two agreed in having the upper surface of a very peculiar hue, all pale ochre, with an orange tint on disks of secondaries. Under side yellow, densely dusted black over whole surface of secondaries; the discal spot, as in *Alexandra*, white without ring. Till this season I have seen no other example, so far as I remember, but in July received several males from Mt. Judith, Monta., agreeing with the type, except that being fresh the color was light ochraceous. By the immaculate under side and peculiar dorsal spot, the species is near *Alexandra*.

And here, behold, a wonder comes to light! Our Doctor says, p. 158: "I have submitted to Mr. H. Edwards a ♂ *Edwardsii*, from W.T., with similar color (to *Astræa*, and he decided that *it was much like Astræa. Now this color was prepared purposely.* When the specimen was taken *it was put in a freshly-prepared cyanide* bottle, &c., &c., by which the yellow color was altered to color of *Astræa* ♂."

On another occasion "I had sent Mr. W. H. Edwards a few Colias from the same expedition." These my ingenious friend had *treated* with *benzine*, and he naively proceeds: "*that benzine changes yellow I have learned only later through experiments made for that purpose.*" "*I made excuses for sending the specimens in bad condition, and was answered that these Colias were especially interesting to him.*"

What an escape! Surely some good angel saved me from the snares of this chemical fowler! When beguiled with cyanide I said it was very near; when tempted with benzine the other said it was very interesting! An enterprising laboratory that of the Cambridge Museum!

C. *Scudderii* is compared with *Occidentalis* before it is dropped into the capacious maw of the *Interior*, along with so many other good species. *Scudderii* really stands next to *Pelidne*, and is entirely distinct from *Occidentalis*, and it is not worth while to spend more words on it.

Colias *Emilia* is put down as identical with *Edwardsii* and *Alexandra*. I might say, which? I have never seen but the pair belonging to Dr. Behr, which I described in 1870, and since that date have not seen these. Dr. Behr was satisfied that they were a distinct species, and he is a good judge. Dr. Hagen quotes Mr. Henry Edwards as saying that the ♂ (which appears all that is left of the pair), "may be a form of *Interior*." It can't be *Edwardsii*, *Alexandra* and *Interior* all together, for they are three species, belonging to two sub-groups.

C. Harfordii. While my perplexed friend has been losing himself in the dust of his own raising, I have spent my summer in trying to learn something of several species of Colias by breeding them from the egg. In other words, while the Doctor has been working at the wrong end, I have done my work at the right end. Three species have I bred in part, and two from egg to imago, and one of these two is *Harfordii*, W. G. Wright of San Bernardino sent me abundance of eggs and young larvæ; the former obtained by tying females in bags over their foodplant, Astragalus, The female of this species is *Barbara*, H.E., but there are ♂ ♀ of the *Harfordii* type, and ♂ ♀ of the *Barbara* type. I have examples which agree precisely with the descriptions, and there are variations from that. *Barbara* is described as bright canary-yellow; *Harfordii* as bright lemon-yellow. Both shades are found in both sexes. The females, some of them, have a close resemblance to the female of *Laurentina*, but, as Mr. Edwards pointed out, the marginal border is different, being pretty nearly of equal width entirely across the fore wing, whereas, in *Laurentina* the border "is apical only, and obsolete before reaching the inner margin." All my females agree with that. The discal spot in both sexes is clear white, in a brown pink ring; the spot of *Interior* is roseate; the marginal border of fore wings in ♂ *Harfordii* is equal throughout its entire length, except that it widens a little at apex, of *Interior* it is like *Pelidne* much advanced on costa, and the inner side presents from inner margin to costa a much curved arc. Some *Harfordii* and some *Barbara* are wholly without extra-discal spots on either wing; others of both have faint traces of these spots, and one ♂, which on upper side is canary-yellow, with narrow straight border, has the under side with discal spot roseate in broad pinkish ring, has large extra-discal pinkish spots on hind wings, black points on fore wings, the patch at outer angle of hind wings. Now on under side I cannot separate this ♂ from a ♂ *Hagenii*, in color or spots. So that *Harfordii* is a peculiar and very interesting species, and presents two sets of characters, allying it to *Interior*, but always with a difference, and to *Hagenii* occasionally, but there also with a difference, for I find no upper surface like *Hagenii*, only now and then an under surface. Dr. Hagen would say that part of these examples were *Edwardsii*, and therefore *Interior*, for it is necessary to make them *Edwardsii* before they can be passed over to *Interior*, and part are *Philodice*. I say that they form one distinct species, and that the resemblance to two other species is due to community of descent.

C. Occidentalis. I received 1 ♂ 2 ♀ of this species from Fort Simpson, 1862, and when Mr. Scudder drew up his description he had the male before him. Why he had not the females I do not now remember; but I see that he describes a white female only, which Dr. Hagen thinks is *Eurytheme*. He has had similar ♀ ♀ etc., etc., from this place or that. Very likely there had been similarity in some points. The normal female is yellow, and is figured in the Plate in B.N.A. The white at best is an aberration, such as is common throughout this genus. Dr. Hagen brings the species to *Interior* as usual. There is one difference between the two that is decisive: the female *Occidentalis* has a broad border to fore wings, made up of black scales disposed in such a way that it incloses a series of yellow spaces down the whole margin, and except apex, the border is of even width. The same style of border characterizes *Chrysomelas*, which I put in same sub-group. Now *Interior* never has such a border, nor does *Laurentina*. I have a long series of these two (though I regard them as one species, from north side River St. Lawrence, from N. Scotia, and Cape Breton—Mr. Scudder's types), and in all cases the border is moderately broad at apex, diminishes gradually and ends above the inner angle and incloses nothing.

Chrysomelas may be looked upon as an intensified *Occidentalis;* very large, the largest Colias in America out of Group 1, with very wide borders to the ♂ ; the borders to fore wings of female always wide with full series of yellow patches; often a wide border to hind wings; the under side often deep orange, thickly-dusted grey; the discal spot often as deep red as *Pelidne*. I have seen a large number of *Occidentalis* taken by Capt Geddes, and they keep to their type very closely, while all I have seen from California keep to the *Chrysomelas* type. So far as the dried insects show, these two are but one species. But Dr. Hagen puts one down to *Interior*, the other as a form of *Philodice*, and he is mistaken in both cases.*

C. PELIDNE BOIS. What this species is is perfectly well known. It is figured in my vol. 2. Dr. Hagen puts *Pelidne* Bd. as a variety of *Palæno* and says that "Edwards and Staudinger give *Labradorensis* etc., as a syn. of *Pelidne*, but the original types labelled by Mr. Scudder himself belong to *Palæno*" p. 172. "Dr. Staudinger says that if both (*Pelidne* and *Palæno*) fly in Labrador at same time he must consider it a proof that both are different species. But *Ariadne* and *Eurytheme* also fly together." Let us look into this a little. In the first place, I was in frequent communication with Mr. Scudder at the time he was writing his Colias paper, and I have now a pair of the *Palæno*, collected by Mr. Packard, sent me by Mr. Scudder, labelled *C. Palæno*. Those I accept as the type of American *Palæno*. *Pelidne* is another matter altogether, and reading over Mr. Scudder's description of *Labradorensis* the insect agrees with it. Why would Staudinger regard the two as distinct if both flew together at the same time? Because one could not be a descendant of the other, as all Labrador butterflies are single-brooded. Dr. Hagen's reply is unfortunate: *Ariadne* and *Eurytheme*, do not fly together, but one is directly descended from the other. And if there were no *Ariadne* there would be no *Eurytheme* in Texas, and *vice versa*. It takes the three forms there to make the one species. In a letter to me, dated 29 May, 1874, Dr. Staudinger says: "C. *Peldine* Bd. and C. *Nastes* Bd. have never been taken in the north of Europe, and also not in Asia, so far as I know. All so-called *Pelidne*, which were European specimens, were only small *Palæno*. *Pelidne* Bd. should have the name given by Boisduval." These are also the published views of Mr. Möschler, as I state in part 2, vol. 2, text of *Pelidne*. Dried specimens will never settle such a question. The opinion of three so competent judges as Boisduval, Staudinger and Möschler is enough for me till the contrary is proved by breeding from the egg.

C. *Chippewa* (described in 1863 as *Helena*, which name was found to be pre-occupied).—This was described from 1 ♂ 1 ♀ received from Fort Simpson, on the verge of the Arctic zone. I inadvertently gave the locality as Slave Lake in my Cat. 1877. This species and *Occi-*

---

* Under *Occidentalis* and *Scudderii*, Dr. Hagen remarks that the silver spots in vol. 1 are changed to black spots; also in some of the plates of Argynnis. My copies are unchanged, and so are some others to which I have been able to refer; but in my own case the plates have never been subjected to the influence of coal-gas, to which I attribute the change in the silver. I purchased a copy from the effects of a subscriber, which had the plates badly discolored, as I believe, by gas, and Mrs. Bowen was able to restore all the damaged plates. Any water-colorist can repair this defect, but I cannot say whether the silver will be more permanent than at first.

dentalis were the only Coliads received from that locality, in a very large invoice of butterflies collected by Mrs. Ross. Since then I have received from the Arctic Sea two other white females, same species, and one yellow female. These three in markings agree fully with the female first seen. Dr. Hagen thinks *Palæno* from the Swiss Alps is identical with these American Arctic examples. I cannot say they are not; but something beside surmises will be required to make me convinced that they are. I only know the two from dried specimens.

Interior is another thing from either *Pelidne* or *Palæno*. They are not even near together. *Pelidne* has white females only; the under side is of a lively green, densely dusted; the discal spot is small and deep red; the upper surface is greenish-yellow. *Interior* is brighter yellow, lacking the green tint, as Mr. Scudder says; the discal spot is large, "the centre composed of silvery and pale pink scales mingled;" the underside is a more sulphur-yellow, with scattered greyish scales (almost immaculate, in fact), and it has yellow females with white aberrations. (Mr. Scudder described the white only, and had but a single specimen, as is stated.)

After all, the Doctor, having, to his own content, demolished so many species, in one case "uniting," as the word is, nine good species as one, winds up in this way: "CONCLUSIONS. The species of Colias found in North America are, from our actual knowledge as follows:" Actual knowledge! that is delicious.

"1. Chrysotheme.
2. Philodice.
3. Interior.
4. Palæno.
5. Meadii.
6. Behrii.
7. Hecla.
8. Boothii.
9. Nastes."

How thankful we ought to be for this assurance. Nevertheless, I am perplexed, because the statement is directly opposed to the principle laid down on page 168, under which all this "uniting" has been done. Why did the Doctor not, on his own conditions, "unite" *Hecla*, *Meadii* *Boothii*, and *Philodice* with *Eurytheme; Nastes* and *Palæno* (taking *Behrii* to be an aberrant relation of the former), with *Pelidne*, and so cut his special centres of creation down to three? And then by a grand coup "unite" them all into one? Queer conclusion from the premises laid down! My own conclusions, after studying the Report, are that the author has not displaced a single one of the N. American species of Colias, as enumerated in my Catalogue. If there are any cases where two species may be seasonally dimorphic forms of one, it has not been proved, and the suggestion that such relationship in one case is possible, is mine.

And as my friend closes with a quotation from Darwin, I will give a few words from an earlier philosopher and sage, to wit, Confucius:

"Permit me, my son, to tell you what is knowledge. What you are acquainted with, consider that you know it; what you do not understand, consider that you do not know it; this is knowledge."

Dr. Hagen has incorrectly given the history of *Eurytheme*. On page 151 we are told: "The breeding of *Eurytheme* and its related forms, by the late J. Boll, in Dallas, Texas, has been the first step to a better knowledge, and to a scientific reduction of the species of Colias. *Mr. Boll had raised Eurytheme through two years*, 1874 and 1875, and had sent, in the summer of 1876, his paper, accompanied with numerous specimens, to Hamburg. This paper was read at the meeting of the Assn. of Naturalists, Sept. 20, and printed directly in the Tagblatt, etc. The excellent paper by Mr. Edwards, N. A. But., Vol. 2, was the result of similar experiments by N. Am. Lepidoterologists.

On page 168, under Philodice, after reproaching me for disagreeing with his views about the "numerous doctrines of the present paper," which he had informed me of in a letter, the Doctor proceeds: "apparently he has forgotten that he persistently separated *Eurytheme Keewaydin* and *Ariadne* as different species, till the late Mr. Boll proved that all three belonged to the same species."

I will here take the opportunity to say, with reference to this obstinate trait with which the Doctor reproaches me, that I work, and have for 20 years worked, on a consistent plan. It may be different from that of other persons, but it leads to good results. If, in my opinion —not another man's—a form of butterfly, of which nothing is known except by the dried specimens, is distinct enough to deserve a specific name, or I may say, in the words of Prof. Richard Owen, "the differences on which the specific character are founded, are constant in individuals of both sexes, so far as observation has reached," I give the name without hesitation. I do not relegate such a form to one of its next allies as a mere variety of it, for the reason that neither I nor any one can tell anything about it except what the dried example itself shows. It has several times happened, after further materials have come in, that I have seen occasion to change my views, and I am not at all unready to change when I see reason. But in many other cases it has turned out that the forms which I have designated as specific are but polymorphic seasonal forms of one species, as in the case of *Eurytheme*. In such a case, at least, I have been right in naming such forms as distinct species, even if I might guess at the possible connection between them. Till breeding from the egg should establish the connection, a connection could not safely be asserted. Conjecture based on field observation only cannot be tantamount to actual proof. We have an element of uncertainty always, and I want certainty. My motto is, "indefinite knowledge is definite ignorance." What business had I to put *Ariadne* with *Eurytheme* from any knowledge we had of these two forms! Usually such polymorphic forms are fully as distinct from each other as many species which have never been doubted, as, for example, the two forms of Grapta *Comma*. In the case of *Ajax* with its 3 forms; Boisduval, a first-rate lepidopterist, named one of them *Marcellus*, as a distinct species; Felder, another first-rate authority, named another of these forms *Telamonides*, and before naming the third one *Walshii*, I sent examples of it to Felder, and received reply that it was distinct from *Telamonides*, and a new species by itself. Now *Ajax*, in one or other of its forms, had been figured for an hundred years, and yet here were two experienced lepidopterists—Boisduval and Felder—who pronounced each of the three seasonal forms to be a distinct species. Bear in mind, all these things were done before the connection of any such forms in any species was established by breeding from the egg. That was my work, and that led the way to numbers of cases of dimorphism or polymorphism being discovered, in each of which two or more forms hitherto described as distinct species were merged into one. It takes the two or the three forms to constitute the species, and each must have its own name. *Telamonides* is not *Ajax*, nor is *Marcellus Ajax* but these and *Walshii* together make *Ajax*. I say, and have said before, that putting down everything as a variety of something else, when we know nothing of the connection, or even whether there be one, is a lazy way of working. It is not my way, at all events. I spot the new form, make it conspicuous, put it where it cannot be overlooked, and leave it to time and fuller materials to determine its position, if there is room for any doubt in the matter. Working in that way, whether I have done good work or not, I am very willing to leave to the lepidopterists who come after me to determine. That it is a very different style of work from that exhibited in the papers I am commenting on, I freely acknowledge.

I by no means wish to detract from the credit due to Mr. Boll. In the text on *Eurytheme*, I fully acknowledged all that was due to him, and I now assert that Mr. Boll never did prove the connection between these three forms, and so establish them as members of one species. He guessed at it, and happened to guess right, but he never proved it. It was Messrs. E. W. Dodge of Glencoe, Nebr., and Mr. T. E. Bean, then of Galena, Ills., who, working with me, did that thing. I had discovered in 1871 the method of inducing female butterflies to lay eggs freely, and the following years set myself at the task of unraveling the history of several species where dimorphism was probable, and one of these was *Eurytheme*. During the next years, I wrote several correspondents in the West soliciting their aid, and two of them responded zealously—to wit, Messrs. Dodge and Bean. These gentlemen followed my directions, obtained eggs, bred the larvæ, made careful notes of their observations, and sent part of the larvæ to me. In our hands the larvæ reached maturity, and their chrysalids gave the butterflies. This was all set forth in the text of *Eurytheme* referred to. Mr. Dodge sent me eleven butterflies bred from eggs laid by ♀ *Keewaydin*, of which seven were *Eurytheme*, four *Keewaydin*. Mr. Bean obtained eggs from ♀ *Eurytheme* in Sept., from which came in the winter 1876-77 sixteen *Ariadne*, or what I called var. A of that form, differing somewhat from typical *Ariadne*, which is found in Texas, but not in Illinois. Mr. Bean also bred *Eurytheme* and *Keewaydin* from *Keewaydin* eggs laid in August. This was all that could be done in Illinois. The missing link in the series was the breeding typical *Ariadne* from *Eurytheme* and *Keewaydin* from *Ariadne*. There I had to rely on what I could learn from Mr. Boll. And what was that? I had opened a correspondence with him on the same subject late in winter '75-'76. His first letter in reply is before me (the first I ever received from him) dated 20th February, 1876, and it reads thus: "Colias *Chrysotheme* is now tolerably abundant, and I intend to make a large collection of it up to the larger *Eurytheme*, so that it will be very hard to determine in regard to these two species where *Chrysotheme* (*Keewaydin*) ends and *Eurytheme* begins. The latter appears the latest, and I venture the conjecture that it must come from the autumn eggs (that is, from *Eurytheme* eggs of the previous year) "or the first forms of *Chrysotheme* emerging in the spring." (At that date Mr. Boll had not distinguished *Ariadne*, and never did till I pointed it out to him.) He continues, "the caterpillars will now soon appear upon the clover, and I hope to find a multitude of them." That shows that in February, 1876, he knew nothing of the connection, from breeding, between these forms, though he might conjecture that *Eurytheme* must be the product or its own form of *Keewaydin*, or joint *Keewaydin* and *Ariadne*, which together he calls *Chrysotheme*. Mr. Boll never obtained eggs from one of these forms, and from eggs bred the larvæ. All he did was to search the clover for caterpillars. These, of course, came from eggs laid by different females, but of what type no knowledge could be possible.

I received the next letter, written May 23, 1876, saying: "This year I have had some *Eurytheme* caterpillars that look exactly like those of *Chrysotheme*, and am confident that the two species are the same, the difference being owing to season." He had found larva which gave *Eurytheme* butterflies, and these larvæ looked like other larvæ which had given *Keewaydin* butterflies, is plainly the meaning there. His published paper shows that he never did obtain eggs, or caterpillars proceeding from *Eurytheme*, even on the clover, so far as he knew.

On the 26th of November, 1876, the third letter: "I had worked out a letter on the dimorphism and variation of a number of N. Am. butterflies, which was presented by my agent in Europe during September, before the Assn. of Nat., and found general interest." The paper itself says nothing about having bred any of the forms from the egg, but these are the words: "From November to May, I often found caterpillars and butterflies together. The former showed no trace of difference either in color or markings, except that they were found somewhat larger in April; but the butterflies, on the contrary, differed. I caught and bred a number of the latter, No. 1–15 of the collection, from November to the end of February," etc., and he goes on to describe what is the form *Ariadne*. Afterwards, he says that 1–15 are *Ariadne*. "Nos. 16–19 were taken in March; 20–25 were taken in April; 26–31 in May; 32, 33 in the last days of June." By the paper, then, it appears that Mr. Boll found caterpillars from November to the end of February, and they gave *Ariadne* butterflies; and not a word is said of obtaining other forms, or butterflies from caterpillars, even found ones I gave a full abstract of Mr. Boll's paper in my text, and added that his conclusions as to the existence of the three forms and their sequence were the result of his observations in the field. "It is the opinion of Mr. Boll that the eggs laid in June do not develop, owing to lack of food, till the summer is past." He had before said that the food plant, Buffalo Clover, dies off before the last June butterflies appear, and does not revive again till the advent of the November rains, so that there was absolutely nothing for the young larvæ to feed upon. And I remarked on this: "I apprehend, if there is any retardation, it must be with the larvæ." Now, Mr. Boll never had obtained an egg from the female of form *Eurytheme* or he would not have conjectured that the egg is retarded from June to October. He would have known whether it hatched or not. In fact, the egg must hatch in three or four days, and the young larva must go into lethargy at the root of the plant, under the surface of the ground, to come up when the rains fall and the clover begins to grow.

Mr. Wright,of San Bernardino, where there is a dry season as in Texas, when green vegetation totally perishes, observed an Argynnis *Coronis* on the ground depositing eggs on the crown of a violet plant (dead at top, of course), under the surface. He sent me the eggs, and they hatched at Coalburgh in the time usual with eggs of the larger Argynnids, and the larvæ went at once into lethargy. In cold weather, or by cold applied, the hatching of butterfly eggs is retarded. but heat has the opposite effect. This shows that Mr. Boll never bred from egg of *Eurytheme*. He saw a regular series of butterflies, increasing, as he says, in size, extent, and intensity of orange as the season progressed. From caterpillars found on the clover, he got what he calls *Chrysotheme* (*Keewaydin* or *Ariadne*, it is not certain which), and in letter to me, but not in his published paper, he says these caterpillars looked exactly like other caterpillars which produced *Eurytheme*, and these also had been found on the clover. He sent me a large invoice of his captures of butterflies, indicating the date at which each one was taken, and I showed him that certain ones were *Ariadne*, certain ones *Keewaydin*. and certain ones intergrades.

So I come back to my first statement, that Mr. Boll did not "breed *Eurytheme* and its related forms" in 1874, '75, or at any time, and so "give the first step to a better knowledge, and to a scientific reduction of the species of Colias;" nor did he "prove that all three (forms) belong to the same species." He surmised it. Messrs. Bean and Dodge and myself proved it, not from field observations only, but actual breeding from eggs laid by females of the different forms found in Illinois and Nebraska. The eggs were obtained expressly to find out the connection, and it was found by us and no other person. The relation of the Texas *Ariadne*, which is not found in Illinois, we had to infer from analogy, and from Boll's field observations.

DESCRIPTIONS OF THE EARLY STAGES OF SOME MEXICAN LEPIDOPTERA.

BY WILLIAM SCHAUS, JR.

PAPILIO THYMBRÆUS. Boisd.

Feeds on chirimoya. Length when mature, 1½ inches; head small, slightly flattened, white, with black markings. The body is rather stout, and segments contracted. The skin is velvety in appearance, and owing to the variety of color, the larva is very handsome. Retractile tentacles red. Segments one and two are dorsally black, with numerous small turquoise blue spots, some of these having a yellow centre. Laterally these segments are white, with a small bright orange spot on each, above which is an irregular black line. Segments 2 and 3 are considerably enlarged. Segment 3 is black dorsally, with two subdorsal blue points placed one before the other. On either side of the anterior blue point is a large yellow spot, and again beyond this three smaller spots, two white and one blue, with orange centre. To either side of the posterior blue point are three white spots. Laterally this segment is pale blue, with three orange spots, one anteriorly and two posteriorly, and separated from one another by a black line. Segment four is very similar to the third segment, but differs in having anteriorly only two spots beyond the large yellow one, and posteriorly in having a sub-dorsal white band, which continues to 12th segment. This is edged with black, and then to either side comes another white dorsal band; beyond these comes a rather broad black band, then a dark green one, and finally a narrow black one. In the sub-dorsal white band on each segment is anteriorly a pale blue spot and posteriorly a yellow one. In the other two white dorsal bands on each segment is a central yellow spot. These last two white bands are replaced on segments ten, eleven, twelve anteriorly by a yellow spot edged with black, and posteriorly by a few pale blue spots. Laterally, beginning at fifth segment, the larva is turquoise blue, which is formed into four bands by three black lines. The blue ground color is more or less spotted with yellow and green. Prolegs and abdominal legs vermilion red, with an orange spot near base. Larva, when about to transform, fastens itself at anal segment by a silken thread passed around shoulders, and in 48 hours becomes a chrysalis. Length of latter, three-fourth to seven-eighth inch, stout, especially abdomen, but tapering to a point at anal segment. At 1st seg. the body is greatly compressed as though a string had been passed around it and then tightly pulled. On thorax is a long cylindrical protuberance. Surface slightly rough. Color, pale green, with a few brown spots on thorax, and dorsally on segments. In the winter, the chrysalis state lasts four months, and in summer from one to two months. The butterfly is only found in the open country, and here chiefly frequents Macuiltepec, a high hill near the town, and covered with very low vegetation. It is to be found the entire year.

PAPILIO POMPEIUS.

Var. Pandion. Feld.

Length when mature, two inches. Head round, brownish green with a few small pale yellow spots. The first three segments increase rapidly in size, the third being the largest. The skin is smooth, and dorsally are two rows of small fleshy protuberances. There is also a single row of these laterally on segments one, two and three. The general color above is olive green, mottled with brown and many irregular small white lines, which give it no regular pattern. Sub-dorsally and posteriorly on each segment is a darker brown spot, which continues on to following segment, making a small dash of color on it. On segment four this brown spot has two small brown spots anteriorly to it. On segments six, ten and eleven laterally the white lines are thicker and more of a cream color. The protuberances are edged on the inner side by a minute lilac line. Prolegs yellowish. Abdominal legs are white, with three gray spots laterally, and covered with short white hairs. Underneath the color is white, except first four segments, which are greenish yellow. Larva fastens itself by tail and a silken thread around shoulders. The retractile tentacles are flesh color. Transforms in 48 hours.

Pupa.

Length, 1¼ inches. It bears the greatest resemblance to a piece of bark, being rough and mottled brown and gray, except outer half of wing cases, which is moss green. In shape it is cylindrical, truncated at top and abdominally tapering rapidly beneath from eighth segment, and forming a slight hollow. On thoracic region are also two depressions. Dorsally on segments are several spiny protuberances,

The imago emerges at end of six weeks. The first specimens out were the largest, the last out the smallest, and also differing in having more white on primaries. From 39 larvæ all emerged in good condition. This is not a rare species here, and is double brooded. Generally met with along the forest roads.

Feeds on *orange and Japote Blanco.*

AGRAULIS (JUNO) V. HUASCAMA. Reak.

Larva.

Length when mature, 1½ inches. Very slight in build. Head black, slightly bilobed, surmounted by two small black horns. Body smooth, black, with numerous irregular reddish brown markings, which are largest on anterior portion of each segment. There are also six rows of black spines of equal length, and placed two dorsally and two laterally. On first three segments the lateral spines are wanting, but seemingly between segments one and two, and between segments two and three is a single lateral spine. The spines are slightly rough. The larva suspends itself by tail, and in about 24 hours transforms.

Chrysalis.

Length of largest, one inch. Compressed laterally and rather long, dark brown. Dorsally two rows of rough excrescences. Thorax with sharp ridge. Head above rather flattened. Apex of wings forming a projecting curve. Antennæ covered with a series of short spiny points. *Imago* emerges in from 20 to 30 days.

A very common species at all times. Agraulis Moneta is also abundant, whereas A. Vanillae is rather rare.

COATLANTONA JANAIS. Dru.

Length when mature, one one-fourth inches. Very slight in build. Head, upper half red, lower half black, thinly covered with rather long black hairs. Body smooth. First segment red; the rest, dorsally light brown, laterally dark grey. The first segment has a lateral short black spine. The second and third segments have four spines, two dorsal and one lateral, and close to prolegs is an almost imperceptible spiny growth. The following segments to the eleventh have each seven spines, the central one being sub-dorsal, and close to abdominal legs is also a growth of short stiff hairs. Segment eleven differs in having eight spines, two being sub-dorsal, one anteriorly and one posteriorly. Segments twelve and thirteen have only two spines each, which are dorsal. The spines are longest on the second segment and are black, with deep blue reflection; they are rather thick at base, which gives them the appearance of growing from a slight wart, and are surrounded at base by a black spot, which thus forms an irregular black transverse band on each segment, to either side of this black band the ground color becomes lighter, forming like a narrow yellowish edge. The larva suspends itself by tail, and in from 24 to 26 hours becomes a chrysalis.

Chrysalis. Length, ½–⅝ of an inch. White, smooth, except on segments where spines of larva are replaced by a rough black point. Wing cases with marginal row of square black spots and several short black dashes. On thorax and pro-thorax are a few black marks, and tongue is also black. Chrysalis state lasts from 18-20 days.

This is the commonest Coatlantona found here and is especially abundant from March to October, but even in the winter months a fresh specimen is now and then seen.

ECPANTHERIA AULEA. Bdv.

Larva. Length when mature 2¾ inches.

Head small, blackish brown, shining. Body smooth dull black. Stigmata reddish brown. Segment one has a few stiff black hairs dorsally, and a lateral small tubercle from which grow stiff black hairs. Segments two and three have four dorsal and two lateral tubercles. The following segments to eleventh inclusive have each six dorsal tubercles placed thus: The two central ones are close together anteriorly, then to either side of these is one placed posteriorly, and then again one anteriorly. Laterally are two tubercles. Seg. 12 has two dorsal and a single lateral tubercle, and segment 13 has only a few bristly hairs. Below, the lower row of lateral tubercles are a few stiff, short hairs on all the segments, except first three. All the tubercles are reddish brown, and thickly covered with rather long black bristly hairs, though in a few rare specimens these hairs are light brown. Underneath the body is black. Prolegs black. Abdominal feet reddish brown. Feeds on all weeds and is exceedingly plentiful. Forms a large very thin silky net, in which are scattered a few hairs, generally under the bark of the liquidamber trees.

Pupa. Length, ¾–⅞ inch.

Oval, very slightly rough and shining. Position of tubercles on larva is replaced on segments of pupa by little groups of downy golden brown hairs, which are so short, however, that it is only on careful examination they are visible. This state lasts from three to six weeks. This is a very common species, and is found the entire year. The moth has thus far offered no variation.

NOTE.—We have great pleasure in printing the above paper from the pen of a young but earnest and talented entomologist, at present pursuing his investigations in Mexico. Mr. Schaus is destined to hold a high rank among our future workers, and will add the knowledge of the life history of many species of that country to the records of our science. We wish him every success in his career, and hope to have our pages hereafter frequently enriched by his valuable contributions.—EDITOR.

NOTES ON LEPIDOPTERA.

EGG OF TOLYPE VELLEDA.—The eggs of this species are deposited in a long and sinuous string, each one attached to its neighbor by the extreme apex, and all of them covered with the down from the abdomen of the parent. They are ovate, very smooth and shining, olive-brown in color. Even with a very powerful lens, I fail to discover any trace of sculpture, but the eggs are thickly covered with a glutinous substance, which causes the abdominal hairs to adhere closely.

HENRY EDWARDS.

ORGYIA BADIA, HY. EDW.—Some time since I received from my friend, Mr. R. H. Stretch, some larvæ of this form, collected by him in Vancouver Island. He desired me to compare them with those of O. *Antiqua* L., but I had no caterpillar of this species at the time. I have, however, recently received some exquisitely prepared larvæ from Messrs. Watkins & Doncaster of 36 Strand, London, and among them examples of *O. antiqua*. I have made a most careful comparison of these and of the larvæ sent by Mr. Stretch, and I cannot find the smallest difference whatever. I therefore am sustained in the opinion I expressed some time ago (Papilio, vol. 1, p. 62), that my

O. badia (which, after all, is a synonym of *O. nova*, Fitch) is the same as *O. antiqua*, L. The synonomy will stand thus:

ORGYIA ANTIQUA, L.

O. nova, Fitch.
O. badia, Hy. Edw.

HY. EDWARDS.

SPILOSOMA LATIPENNIS. Stretch.

This apparently rare species seems to have its home on Long Island. I received it on one occasion from Rev. G. D. Hulst, and on the 16th of June last I took a very fine pair near Flushing. It is a most active insect, and when disturbed flies rapidly to a great distance. In this respect it is very unlike its congener, *S. virginica.* When about to rest it settles on the under side of leaves, as is the habit of many Geometridae. HY. EDWARDS.

COSSUS ROBINIÆ CONGREGATING.

Having obtained a few larvæ of Cossus Robiniae from a locust tree broken by a storm last winter, I kept them in a tin box with sawdust and chips until the beginning of May. I then turned them into a large glazed fern case outside my window; they had then partially formed cocoons. About noon, June 22, I saw a female, with yet undeveloped wings, crawl rapidly to the top of the vivarium, having just emerged from pupa. In less than ten minutes several males were flying swiftly round the house; about 50 large locust trees are exactly opposite. consequently I could not be in a more favorable locality for this species, but although I have carefully searched the trees during June and July for several seasons, I never before found a male of this insect, and only two females; yet, on this occasion I captured no less than 70 males in fine condition, all attracted by this one female during the afternoon and evening. They flew in a rapid direct flight, making a loud buzz (more like that produced by some Coleoptera than the hum of the Sphingidæ); the weather made no difference to their flight; the day was bright, with occasional showers, but they flew just as freely in the rain as in the sunshine. After dark, the number abated, yet an occasional one flew in until ten o'clock, and strange to say, two fine females of the same species flew in my room to light the same evening. Business called me from home next morning, so I killed the female for a specimen. I had never seen any record of this insect being a day-flyer, and think the fact will be new to many entomologists. The lively habit of this species is in direct contrast with those of *Cossus ligniperda* of Europe, which may be found in great numbers sticking on the trees infested by them,a few inches above the empty pupa case, any afternoon during their occurrence, both sexes being extremely sluggish during the day. DAVID BRUCE, BROCKPORT, N.Y.

SAMIA CEANOTHI.

I received a few cocoons of *Samia ceanothi* from a correspondent in

California. A fine female emerged one day during my absence from home, and the males of *S. cecropia* congregated in such numbers on the outside of the vivarium in the evening as to alarm my family, the noise of their fluttering wings on the glass being mistaken for fire. My boys caught 50, and said there were "hundreds more." DAVID BRUCE.

STEGANOPTYCHA CLAYPOLEANA.

Through the courtesy of Prof. E. W. Claypole we recived this spring from Mrs. L. H. Lewis some larvæ of the buckeye stem-borer noticed in the November 1882, issue of the *American Naturalist* (p. 914), and have obtained therefrom a number of perfect moths. The general resemblance of some of the specimens to others of *proteoterus æsculana* is great; but with the perfect specimens the differences upon close inspection becomes quite marked. *Claypoleana* lacks the notch in posterior borders of primaries, the tufts of raised scales on the disc of same, and the peculiar tufts or pencil of hairs on the upper surface of secondaries in the ♂, between the margin and the costal vein. It is a shorter, broader-winged species; the ocellate spot is less distinctly relieved, the median oblique band more broken, the basal-costal portion paler and contrasted along the median vein with a darker shade, which may be almost black, and which broadens posteriorly till near the middle of wing, where it is abruptly relieved by a pale space obliquing basally. By these characters the species is easily distinguished from *æsculana*, and it is withal a greyer species with the pale and dark shades more highly and abruptly contrasted. In an article by Prof. Claypole, which appeared subsesequent to our note (Psyche, III., p. 367, issued Dec. 16, 1882), he states that Prof. Fernald referred the species provisionally to *Steganoptycha*, Stephens, and this reference is evidently correct.

None of the larvæ we received were boring in the leaf-stem, but rolled themselves up in the green leaves upon which they fed. It is doubtless more of a blossom and leaf feeder than a stem-borer. The larvæ were feeding during the first half of May, and the moths issued during the first week in June. C. V. RILEY.

MATING OF CECROPIA AND CYNTHIA.

This spring, having a ♀ *Cynthia*, and wishing to obtain some eggs, I tied her out in my yard to mate. What was my surprise in the morning to find her attached to a ♂ *Cecropia*. She laid a number of eggs, but only four of them hatched. After nibbling for a while on linden and ailanthus, the young larva died, very much to my sorrow. I turned out some *cynthia* some years ago, and now the species is very common in our city. G. R. PILATE, Dayton, Ohio,

A NEW ZYGÆNID. TRIPROCRIS MARTENII. n. sp.

Exp. .95 inch.

Color uniform dull black, not so brassy as *T. Smithsonianus*; thinly scaled, so that the veins show prominently. Primaries slightly produced apically. Discal cell pedicelled, of the ten short veins given off from it, the 4th has its origin with the 3d immediately on the cell. The antennæ are less deeply pectinate than in the allied species. Described from 1 ♂ and 5 ♀, taken in Arizona by Mr. H. K. Morrison.

G. H. French, Carbondale, Ill,

DREPANA CURVATULA.

Zoological Department, British Museum.
July 6th, 1883.

My Dear Sir: In incorporating some of onr mutual friend Grote's Lepidopetera with the Museum series, I note a *Drepana* labelled "*curvatula*," which agrees in all respects with my Japanese species *D acuta*, but differs from the European *D. curvatula* in its greatly superior size and other particulars which I here tabulate:

D. curvatula.	*D. acuta.*
Exp. al. 31–35 mm.	Exp. al. 37–42 mm.

The measurement taken from tip of primaries to centre of thorax and doubled.

D. curvatula.	*D. acuta.*
Lilacine brown, with an ochraceous sub-tint.	Uniform clay-yellow.
Lines on primaries before the middle, placed at unequal distances, sometimes confused.	Lines on primaries before the middle, at equal distances, never confused.
Oblique elbowed line across disc double, distinctly inarched.	Oblique elbowed line across disc single, almost straight.
Secondaries divided into a greyish basal and a yellowish external area; the two areas divided by a well-defined line.	Secondaries of uniform, or nearly uniform, tint, with no marked distinction in the definition of the lines.

As it is highly probable that Mr. Grote's specimen was of N. American origin (he doubtless knows where it was obtained), I think it may be of interest to American Lepidopterists if you publish this note in "Papilio."

Believe me, yours very sincerely,

Arthur G. Butler.

Henry Edwards, Esq.

Cecropia and Columbia.

This year we had a ♀ *Cecropia* hatch in one of our rooms, and, a score or more of *Samia Columbia* were attracted to the place. Can anyone doubt that the latter is an offshoot of the former?

A. J. Cook, Lansing, Mich.

Rare Captures.

The following species have recently been taken: *Aellopus tantalus* Albany, N. Y.; *Arctia Americana*, Malden, Mass.; *Erebus Zenobia* Madison, Wis.; *Erebus Odora*, Albany, N. Y. W. Grey.

Etudes d'Entomologie.

Under this title an exquisite work on Lepidoptera is in course of publication by M. Charles Oberthur, of Rennes, Ille et Vilain, France. The number before me contains 3 plates, with 44 figures, which are faultless in drawing and general execution. The work will be completed in about 12 numbers, and will be a most valuable contribution to entomological science. HY. EDWARDS.

KILLING LEPIDOPTERA.—I have been experimenting with the Hypodermic syringe for killing Lepidoptera ever since last fall, and am satisfied of its efficiency. I use a clear solution of cyanide of potassium in alcohol, and by introducing the lancet point of the syringe and injecting a drop of the fluid in the thorax it kills instantly and does not leave any stain on the outside. I have used it in every instance so far on the Lepidoptera as they emerge from the chrysalis. The scales and hairs are thus not disturbed in the least, and the specimen really requires less handling. On trying it with some *Cecropia*, etc., they were dead before putting them down. C. W. BLAKE.

TO OUR SUBSCRIBERS.

January 19, 1884.

With great regret I am compelled to relinquish the active editorship of "Papilio," the demand upon my time from other and more exacting matters rendering it impossible for me to continue the superintendence of the journal. It gives me, however, great pleasure to be able to state that my friend, Mr. E. M. Aaron of Philadelphia, will accept the position I have vacated, and I am confident that under his able guidance, the continued success of "Papilio" is assured. Mr. Aaron's address is P. O. Box 2,500, Philadelphia, Pa., and I beg that all subscriptions and communications be forwarded to him. I wish most warmly to thank all my friends and correspondents for the generous support they have given the journal lately under my charge.

HENRY EDWARDS.

ERRATA.

On page 136 read Geometridæ.
On page 150 read Rectilinea, Fr.
On page 151 read Michabo, Gr.
On page 160, Nos. 8 and 9, Colias, are uncertain, and should be blank, with an ?.

PAPILIO.

DEVOTED EXCLUSIVELY TO LEPIDOPTERA.

VOL. IV.

EDITED BY

EUGENE M. AARON.

PHILADELPHIA:
GEORGE B. CRESSON, ENTOMOLOGICAL PRINTER.
1884.

INDEX.

VOL. IV.

INDEX TO AUTHORS AND SUBJECTS.

BOOK NOTICES.
  Check-List of Insects of Canada; Label List of same . . 80
  First Annual Report of Injurious and other Insects of New York; by J. A. Lintner 81
  Synopsis of N. Am. Species of Satyrus; by John B. Smith . 81
EDITORIAL COMMENT.
  Appreciative Entomologists 109
  European *versus* American Entomologists 111
  Multiplication of Synonyms 171
  Possible discontinuance of PAPILIO 134
  Permanent Curatorship of Am. Ent. Society 166
  Prof. Lintner's First Annual Report 111
  W. H. Edwards' New Catalogue 109, 147
NOTICE TO SUBSCRIBERS; by Hy. Edwards and E. M. Aaron . 1
AARON, EUGENE M.
  A Question of Priority . . . . 131.
  Eudamus Tityrus and its varieties 25
AARON, S. FRANK.
  Certain methods of judging and describing new species . 49
  Collecting on Gulf Coast of Southern Texas 159
AARON, E. M. and S. F.
  List of collection of Diurnal Lepidoptera from So. Texas . 172
ANGUS, JAMES.
  Notes on some species of Catocala 35
BEUTTENMÜLLER, WM.
  Food-plants of Lepidoptera 155
BUTLER, A. G.
  On the generic distinction of Megonostoma 58
  Touching the so-called "Controversy" concerning Species. 39
EDWARDS, HENRY.
  Apparently new species of N. Am. Heterocera 121
  Notes on Mexican Lepidoptera 11, 59, 75
  Some new forms of N. Am. Moths 43
  The genus Gloveria 105
  The lepidopterous genus Datana 23

EDWARDS, W. H.
Capitalizing specific names 34
Descriptions of new butterflies, mostly from Arizona . . 53
Notes on Colias Christina and C. Astræa 30
On some Historical Errors 167
Preparatory stages of Colias Harfordii and C. Barbara . 2
" " Lycæna Melissa 91
" " Melitæa Chalcedon, etc. 63
" " Phyciodes Camillus 128
" " Papilio Zolicaon 162
FRENCH, G. H.
Arctia Geneura, Strecker.—Female 158
New species of Gnophæla 20
Preparatory stages of Catocala Amatrix 8
" " Drasteria Erichtea 148
GROTE, A. R.
A new species of Nystalea 7
GRUBER, AUGUST.
On the caterpillars of N. Am. Papilionidæ and Nymphalidæ: translated from the German by C. E. Aaron; with 3 plates. 83, 115
HAGEN, H. A.
Types of Tineina in the Cambridge Museum, Mass. . 96, 151
HOLLAND, W. J.
Description of a new species of Sphacelodes 72
KIRBY, W. F.
On a copy of "Peale's Lepidoptera Americana" in the British Museum 103
LINTNER, J. A.
On some Rio Grande Lepidoptera 135
MONOGRAPHS OF N. AM. LEPIDOPTERA 38
NEUMOEGEN, B.
New Heterocera from various parts of our continent . . 94
RILEY, C. V.
On the Dimorphism of Teras Oxycoccana 71
SCHAUS, WM.
Early stages of Mexican Lepidoptera 100
SMITH, JOHN B.
Hübnerian 183
STRECKER, HERMAN.
Citheronia Infernalis and Catocala Babayaga 73
WRIGHT, W. G.
Description of a new Hemileuca 19
Preparatory stages of Lycæna Amyntula 126

NOTES AND QUERIES.

- AARON, E. M.
  - Denudation for study 21, 62
  - Erycides Okeechobee 22
  - Eudamus Zestos 61
  - Mr. Strecker's Collection 41
  - Notice to Subscribers 114
  - Pamphila Baracoa in Florida 150
  - Pamphila Cernes 62
  - Pamphila Panoquin in New Jersey 22
  - Unusual Occurrence 112
- BEHRENS, JAMES.
  - Agrotis Vorax 21
- EDWARDS, HENRY.
  - Mexican Lepidoptera 41
  - Papilio Antimachus 21
- EDWARDS, W. H.
  - Callidryas Philea and Terias Mexicana in Wisconsin . . 113
  - Limenitis Eros 62
- ELWES, H. J.
  - Concerning so-called species 113
- ENTOMOLOGICAL CLUB OF THE A. A. A. S. 114
- FERNALD, MRS. C. H.
  - Sexual attraction in the genus Samia 42
- FRENCH, G. H..
  - Gnophæla Arizona 112
- HOWARD, L. O.
  - Entomological Society of Washington, D. C. 82
- MANN, B. PICKMAN.
  - A new Entomological Society 41
- PEALE, T. R.
  - "Lepidoptera of North America" 150
- SCHAUS, W. J.
  - Pachylia Ficus 21
- SMITH, JOHN B.
  - Polia Vorax 114
  - Reply to the Editor 112
- WEED, CLARENCE M.
  - Parasites in cocoons of Samia Columbia 112
- WORTHINGTON, C. E.
  - Killing large Lepidoptera 41
- WRIGHT, W. G.
  - Collecting in Southern California 113

GENERAL INDEX.

A

Achlyodes Thraso . . 145
Acopa Pacifica . . . 46
Acronyctodes, new genus . 78
" Insignita . 78
Aegeridae, Rio Grande . 146
Agarista Grotei . . . 13
Agraulis Vanillæ . . . 140
Agrotis Vorax . . 21, 114
Alypia Disparata . . . 13
" Grotei . . . 13
" Hudsonia . . 43
" Octomaculata . . 146
Alypioides Flavilinguis . 13
Amblyscirtes Eos . . 144
Ameria Nigricosta . . 14
" Unicolor . . 146
Amphonyx Cluentius . . 11
Anæa Andria . . . 179
" Glycerium . . . 179
Anisota Suprema . . 16
" " early stages 102
Antarctia Expressa . . 60
Antepione Imitata . . 48
Anthœcia Petulans . . 123
Apatelodes Angelica . . 146
" Vivax . . 77
Apatura Antonia . . 141, 178
" Celtis . . 141, 178
" Cocles . . 141, 178
" Leilia . . . 178
Arctia Eminens . . . 59
" Geneura, female . 158
Arizona Butterflies . . 53
Argynnis Arge . . . 42
" Myrina, larva 91, 120
Astragalus Crotalariæ . . 126

B

Basilodes Mirabilis . . 94
" Territans . . 45
Bombycidæ, Mexican . . 14
" new . . 44
" Rio Grande . 146

C

Calledapteryx opinaterata . 18
Callidryas Philea . . 113
" Eubule . . 173
" Sennæ . . 173
Catocala Abbreviatella . . 37
" Amatrix, preparatory stages . 8
" Angusi . . 35
" Arizonæ . . 74
" Aspasia . . . 74
" Babayaga . . 73
" Dionyza . . 124
" Hero . . . 125
" Insolabilis . . 35
" Nuptialis . . 37
" Obscura . . 36
" Phœbe . . . 125
" Residua . . 35
" Walshii . . . 74
" Whitneyi . . 37
Charadra Nigracreta . . 17
Charis Cænius . . . 143
Chlosyne Adjutrix . . 177
Citheronia Infernalis . . 73
Colias Astræa . . . 30
" Barbara . . . 3, 4
" Boothii . . . 41
" Cæsonia . . . 139
" Christina . . . 30

Colias Eurytheme . . 139
“ Harfordii . . . 3, 4
“ “ prep. stages 2
Copæodes Procris . . 143
“ “ var. Waco 180
Ctenucha Modulata . . 14
“ Proxima . . 14
“ Venosa . . 146
“ Votiva . . . 13

D

Danais Archippus . . 140
“ “ larva . 116
“ Berenice . . . 140
“ “ var. Strigosa 175
Datana, the genus . . 23
“ Drexelii . . . 25
Deilephila Lineata . . 145
Diludia Collaris . . . 12
Dioptis Nervosus . . . 15
Dircenna Klugii . . . 140
Drasteria Erichtea, egg and larva 148
Drasteria Erichtea, chrysalis 149
“ Magnifica . . 18
Drepanodes Vehemensaria . 19

E

Ecpantheria Leucarctioides . 41
“ Sennettii . . 147
“ Tenella . 15, 41
Elachistidae, genera and species in Camb. Museum . 153
Elysius Russatus . . . 60
Eresia Graphica . . 177
“ Texana . . . 141
“ Punctata . . . 177
Erycides Batabano . . 42
“ Okeechobee . 21, 42
Erycinidae, Rio Grande . 143
Euchætes Emendatus . . 61
“ Fumidus . . 61
“ Immanis . . 75
Eudamus Albofasciatus . 182
“ Tityrus . . 26
“ Zestos . . . 61
Eudule Nigricosta . . 14
Euhalisidota Aperta . . 77
“ Cervina . . 77
Eulithosia, new genus . . 43
“ Composita . . 44
“ Thoracica . . 44
Euptoieta Claudia . . 140

F

Food-plants of Lepidoptera. 155
Fruva Deleta . . . 124
“ Modesta . . . 124

G

Gelechia, species in Cambridge Museum . . 98
Geometra Iridaria . . 19
Geometridae, Mexican . 18
“ new . . 47
Gloveria, new genus . . 105
“ Arizonensis . . 107
“ Dentata . . 107
“ Jalapæ . . . 109
“ Olivacea . . 108
“ Venerabilis . . 108
Gnophæla Arizona . 20, 112
“ Hopfferi . . 112

H

Hadena Metallica . . 17
“ Viridis . . . 17
Halisidota Armillata . . 76
“ Cinctipes . . 76
“ Mansueta . . 75
“ Propinqua . . 76
Heliconia Charitonia . . 14
Heliothis Suavis . . . 45
Hemileuca Electra . 19, 42
Hepialus Confusus . . 122

Hesperidæ, Rio Grande . 143
Heterocampa Lunata . . 44
" Muscosa . 79
" Superba . . 121
Hypena Baltimoralis . . 112
" Inclyta . . . 80
Hyperchiria Schausii . . 16

J

Josiodes Distincta . . 14
" Inversa . . . 14
Junonia Lavinia . . . 141

K

Kricogonia Fantasia . 138, 174
" Lanice . 138, 174
" Lyside . 137, 174
" Terissa . 138, 174

L

Lagoa Superba . . . 79
Lepidoptera, Mexican . . 11
Libythea Carinenta . . 142
Limenitis Arthemis, larva . 116
" Disippus " . 116
" Eros . . . 62
Lithocolletis, species in Cambridge Museum . . 151
Lithosidae, Mexican . . 14
" new . . . 43
Lycæna Alce . . 143, 180
" Amyntula, larva . 126
" " pupa . 127
" Cyna . . . 180
" Antibubastus . . 180
" Exilis . . . 143
" Filenus . . . 180
" Hanno . . . 180
" Gyas . . . 143
" Isola . . . 180
" Melissa, preparatory stages . . . 91

Lycænidæ, Rio Grande . 143
Lycomorpha Contermina . 13
" Marginata . 13

M

Macrosila Collaris . . 12
Mecoceras Schausaria . . 18
Megonostoma, generic distinction of . . . 58
Melicleptria Exalta . . 124
" Septentrionalis . 45
Melanchroia Spuria . . 15
Melitæa Albiplaga . . 175
Melitæa Chalcedon, prep. stages 63
Melitæa Bollii . . . 176
" Definita . . . 176
" Didyma, larva . 91
" Elada, var. Perse . 175
" Imitata . . 175, 134
" Marcia, larva . 90, 120
" Nycteis, " . . 53
" Phaeton, " 68, 89, 120
" Tharos, " . . 90
" Ulrica, " . 132, 175
Metræa Argentalis . . 19
Mexican Lepidoptera . . 11

N

Nathalis Iole . . . 137
" " var. Irene . 172
Neonympha Areolatus . . 142
" Gemma . . 142
" Sosybius . . 142
Nisoniades Funeralis . 144, 182
Noctuidae, Mexican . . 16
" new . . . 44
Nymphalidae, caterpillars 89, 119
" Rio Grande . 140
Nystalea Indiana . . . 7

O

Opharus Euchætiformis . 15

P

Pachylia Ficus 21
Pamphila Baracoa, in Fla. . 150
" Bellus 57
" Brettus 144
" " var. Brettoides . . . 180
" Cernes 62
" Campestris . . . 180
" Cestus 57
" Comus 181
" Deva 55
" Eos 181
" Huron . . 143, 180
" Iowa 181
" Lasus 54
" Lunus 56
" Manataaqua . . 62
" Osceola . . . 181
" Otho 144
" Panoquin . . . 22
" Phylæus . . . 144
" Vestris 181
" Vitellius . . . 181
Papilio Ajax, larva . . . 188
" Antimachus . 21, 41
" Asterias 136
" " larva . . 84
" Brevicauda, larva . 85
" Cresphontes . . 136
" Daunus, early stages. 100
" Helleri, early stages . 101
" ~~Machaon, larva . . 86~~
" Philenor 136
" " larva . 88, 118
" Pilumnus, early stages 100
" Thoas, var. Cresphontes . . . 172
" Troilus, larva . . 87
" Turnus, " . . 86
" Zolicaon, early stages 162
~~Papilionidæ, caterpillars — 84, 115~~
Papilionidæ, Rio Grande . 136
Pericopis Schausii . . 59
Perigæa Benigna . . . 122
" Continens . . 122
" Dilecta . . . 123
Phasiane Aberrata . . 47
Philampelus Linnei . . 145
Phœbis Agarithe . . . 137
Pholisora Catullus . . 145
" Hayhurstii . . 145
Phyciodes Camillus, egg and larva 128
Phyciodes Camillus, chrysalis 130
" Emissa . . 130
" Harrisii . . 57
" Nycteis, var. Drusius . . . 57
" Phaon . . . 141
" Tulcis . . . 177
" Vesta, var. Boucardi . . . 177
Pieris Amaryllis . . . 136
" Protodice . . . 136
Plusia Snowii 44
Plusiodonta Effulgens . . 79
Polia Vorax 114
Proteides Zestos . . . 26
Pseudalypia Crotchii, var. Atrata 121
Pyralidæ, Mexican . . 19
Pyrameis Atalanta . . 141
" Huntera . . 141
Pyrgus Locutia . . . 181
" Tessellata . . 144, 181
" Syrichtus . . 181
Pyrrhomorpha Fusca . . 43

R

Rio Grande Lepidoptera . 135
Robinsonia Perfecta . . 60

S

Samia Columbia . . . 112

Satyrus Incana 112
Seirarctia Bolteri 121
Sennett, Geo. B., expeditions 135
Smyrna Bloomfildia, early stages 102
Smyrna Karwinskii, early stages 101
Snowia, new genus . . 95
" Montanaria . . 96
Sphacelodes Floridensis . 72
Sphingidæ, Mexican . . 11
" Rio Grande . 145
Sphinx Insolita 145
" Quinquemaculata . 145
Stiria Nanata . . . 95
Synchloe Adjutrix . . 141
" Lacinia . . . 177
" Mediatrix . . 177
" Saundersii . . 177
Syneda Perfecta . . . 46
" Perplexa . . . 47
Synedoida Aegrota . . 47
Systasea Zampa . . . 144

T

Tamila Arefacta . . . 123
Teras Oxycoccana, dimorphism 71
Terias Linda . . . 53
" Lisa 139
" Mexicana . . . 113
" Nicippe . . . 139
Tetracis Indiscretata . . 48
Thanaos Tristis . . . 182
Thecla Blenina . . . 179
" Humuli . . 143, 179
" Læta . . . 22
" M-album . . . 22
" Melinus . . . 179
" Poeas . . . 143
" Siva 179
Thyatira Batis . . . 16
Triprocris Aversus . . 13

V

Varina, new genus . . 94
" Ornata . . . 94

Z

Zygænidæ, Mexican . . 13
" new . . . 13

PAPILIO.

DEVOTED TO LEPIDOPTERA EXCLUSIVELY.

Vol. IV, No. 1.--JANUARY, 1884.

Subscription Two Dollars per Annum (Ten Numbers).

—EDITED BY—

EUGENE M. AARON.

PHILADELPHIA:
Hazzard & Cresson, Entomological Printers,
No. 55 North Seventh Street.
1884.

PAPILIO.

A Journal, devoted to Leipidoptera exclusively, published monthly, July and August excepted. Price, $2.00 per annum. Exchanges of Entomological writings with societies and authors throughout the world are earnestly desired. Advertisements will be inserted on the covers of PAPILIO at the rate of $1 a year for 6 lines or less. Longer advertisments may be contracted for at equally low rates. Sample copies forwarded on receipt of 21 cents. Back numbers supplied. All communications and remittances should be addressed to

EUGENE M. AARON,
Lock Box 2500, Philadelphia, Pa.

H. K. MORRISON,
Dealer in Insects of all Orders,
Box 35, Morganton, Burke Co., N. C.

Complete collections, particularly rich in Lepidoptera and Coleoptera, from the following desirable localities:

Key West, Fla., **Nevada,**
Louisiana, **Idaho.**

I have at present many rare Lepidoptera from Arizona, and large series of Coleoptera from Arizona, Washington Territory, California, Montana, and North Carolina. Single specimens at reasonable rates, and series offered on very low terms.

Especial care given to making collections to order in any group: larvæ, Micro-lepidoptera, Galls and gall insects, and families to which, in general, little attention is paid. Collections bought. Lists and full particulars in regard to Entomological material on hand sent on application.

A. W. PUTMAN CRAMER, 51 Douglas Street, Brooklyn, E. D., wishes to exchange with collectors of Lepidoptera.

The undersigned is desirous of procuring, by purchase or otherwise, the *Ægeriadæ*, *Cossidæ*, *Hepialidæ* and *Plusias* of the world. Asiatic, African and South American forms much desired.

HY. EDWARDS,
Wallack's Theatre,
New York.

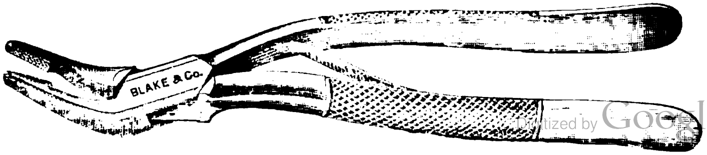
B. NEUMOEGEN, P. O. box 2581, New York City, wishes to arrange with collectors in all parts of the world for the collection of Lepidoptera. Will also exchange.

FOR SALE.—CHECK LIST of the MACROLEPIDOPTERA of America north of Mexico (Diurnals, Sphingidæ, Sesiidæ, Zygænidæ, Noctuidæ, and Geometridæ). Price, 50 cents. Address, Entomological Society, 9 Broadway, E. D., Brooklyn.

NAT. SIZE.

A new disinfectant for Entomological Cabinets. The material is in the form of cones, cast around a pin, so that they are ready for immediate use; are clean, and occupy very little space. They are highly recommended by Drs. Leconte and Horn, and Messrs. Hy. Edwards, E. T. Cresson, and E. M. Aaron. Price per hundred, $1.00; postage, 10 cents.

ENTOMOLOGICAL FORCEPS.—Designed more particularly for Lepidoptera, but useful for all orders. Price, nickel-plated, $2.50. Sent by mail, on receipt of price. BLAKE & CO., 55 North Seventh Street, Philadelphia.



HALF SIZE.

PAPILIO.

Devoted Exclusively to Lepidoptera.

Edited by
Eugene M. Aaron,
Lock Box 916.

Philadelphia, April, 1884.

Vol. 4.
No. 4.

DESCRIPTION OF THE PREPARATORY STAGES OF MELITÆA CHALCEDON, BOIS., WITH SOME NOTES ON LARVÆ OF M. PHAETON.

By W. H. Edwards.

Egg.—Sub-conical, the base rounded and flattened, the top truncated, depressed, and finely reticulated in irregular five-sided figures around a central rosette of five; surface smooth; the upper third marked by about twenty low, vertical, sharp ridges, which increase gradually in elevation and end at the rim of summit; color when laid lemon-yellow, later changing to crimson, and before hatching, to black. Duration of this stage about fourteen days.

Young Larva.—Length .1 inch; cylindrical, even from 2 to 11, the segments slightly rounded; color dark green-yellow; on each segment are several black tubercles, each of which gives a long tapering black hair; 2 has a sub-oval black chitinous patch on dorsum, and on either side of the medio-dorsal line are three fine tubercles, the six arranged so that four come to the front, and two behind, each of the latter midway between the front pair; besides these, there are three tubercles on either side this segment, two in vertical line in front, and one higher up and behind; each segment from 3 to 12, inclusive, has six dorsal tubercles; on 3 and 4 these are nearly in cross row, the two middle ones standing a little in front; on the succeeding segments there are four in front, in line, and one behind and between each pair; these tubercles form six longitudinal rows; along base of body is a row of finer tubercles, on some segments two; 13 has the four in front, but close together, and the other two are outside and below; at the extreme end is a chitinous patch, from which two hairs; the hairs on 2 to 7, and the lower of the six rows to 9 turn forward, those on dorsum of 6, 7 and 8 stand upright, on the other segments they turn back; the basal row has one hair each on 2, 3 and 4; on 5 to 12, two each, not in line, the posterior one being at the back of the segment, and higher up; all the hairs bent down; head rounded, depressed a little at the top, the vertices rounded; color dark brown, smooth, with a few black hairs curved down. Duration of the stage about eight days.

After first Moult: slender, cylindrical; color dark brown, a medio-dorsal stripe, greenish yellow; there are seven principal rows of spines, one dorsal, three on either side, disposed as hereinafter described for mature larva; all but the dorsals black, these are the color of the band or stripe they stand on, greenish yellow; the spines are long, slender, tapering, with divergent black bristles placed at a small angle; along base a row of minute spines; 2 has a chitinous cross-band, with several fine points, each with a long black hair; head ob-ovoid, truncated at top and depressed, the vertices rounded; color black, shining, thickly beset with long black hairs which hang over the front. Duration of this stage nine days.

After second Moult: length .24 inch; very much as in preceding stage; the dorsum and upper part of side brown-black, the lower part of side brown-gray; the dorsal spines and bases green-yellow, and a little of same color at base of second laterals on the outer side; head as before. Duration of this stage twelve days.

After third Moult: length .33 inch; color black; along dorsum a whitish band, or double stripe, the intervening space making a black medio-dorsal line; the whole surface of upper side thinly dotted with white points, each of which gives a long white hair; the dorsal spines black from orange bases; the first laterals black from shining black bases; the second laterals black, but on the lower side at base is an orange patch encircling the spine, except on the dorsal side; the third laterals orange, from bases of same color, on 2 and 3, the rest black with a little orange on upper side; the row over feet all orange; head ob-ovoid, flattened frontally, deeply bilobed, the vertices rather high, sub-conic, the face rough with tubercles of various sizes, each giving a long black hair. Duration of this stage eleven days.

After fourth Moult: length .45 inch; closely like previous stage; there is a great difference in the last two stages in the clothing of body, some larvæ having a few white points, and corresponding white hairs, but the greater number have these points thickly sprinkled over whole upper side, and the numerous long hairs from them give a very woolly covering. Duration of this stage nine days.

After fifth Moult: length .7 inch; at about eight days is fully grown.

MATURE LARVA.—Length 1.1 inch; greatest breadth .2 inch; cylindrical, of even size to near the extremities; color black over upper part of side and dorsum, lower part of side brown-black; along dorsum a double whitish stripe, and a macular whitish stripe in line with second lateral spines; whole surface covered with white tuberculous points, of varying sizes; these are sometimes comparatively few in number, but usually they are many, and as each gives a long curved white hair, the surface is woolly; the spines are in seven principal rows, one dorsal, three on either side; in addition there is a row of smaller spines along base, from 3 to 11, over the feet and legs two to each segment in horizontal row; on 4 two in vertical row; on 5 two in horizontal and a third below, the three making a triangle; on 11 and 12 one each; on under side of body, on 5, 6, 11 and 12 are numerous small spines on the cross ridges; the dorsal spines run from 5 to 12, and together with their bases, are orange; the first laterals run from 3 to 13 and are black; the second laterals run from 3 to 13, are black, with orange around base, but usually wanting on the dorsal side; the third or lower laterals run from 3 to 11, the one on 3 small and orange, that on 4 orange, both orange at base, the rest orange with a little patch of same color at base on upper side only; the row along base wholly orange; the spines are moderately long, slender, tapering, rough with tuberculations, from each of which springs a long hair, those of upper rows partly white next base of spine, the others black; 2 has a collar of low black spines with many long black hairs; feet black, pro-legs brown; head ob-ovoid, truncated, depressed at top, the vertices low, sub-conic, and rough (as well as upper part of face) with tubercles, each of which gives a long stiff black hair, so that the top of the head bristles with these; color black. From last moult to pupation about fourteen days.

CHRYSALIS.—Length .8 inch; breadth across mesonotum .26 inch, across abdomen .22 inch; head case narrow, truncated, the top a rounded transverse ridge, the sides incurved; mesonotum rounded, slightly prominent at top and angular, followed by a rounded excavation; the abdomen stout; the larval spines of dorsal and two upper rows on either side are indicated by low conical tubercles; the spines of third row by a slight elevation on surface; color gray and pearl, marked and spotted with black, or brownish black, these marks and spots often edged with orange; the tubercles each edged on front side by a black crescent; behind the dorsals two short, oblique black bars, on some segments confluent with the crescents of the first lateral row; on segments 7 to 11 is a row of short black bars on the posterior part of each; on the ventral side, a blackish band of irregular outline from last segment to head, there bifurcating; the antennæ cases alternate black and gray; a long black patch lies on middle and basal part of wing cases, usually edged with orange, and crossed by orange neurations; along the hind margin of wing a series of stripes or small black spots, rounded or serrated, and there is a second interior row varying in like manner; on the sides of mesonotum two curved bars meeting at an angle on the carina; a straight bar higher up running with the dorsal line; a few patches on top of head case. Duration of this stage about twelve days.

The mature larva and chrysalis of *Chalcedon* are figured in But. N. A. Vol. I, from drawings by Mr. Stretch. This larva indicates rather indistinctly the white points which cover the surface, but gives no idea of the tangle of white hairs which proceed from these points, which often quite conceal the surface of the body; other larvæ, however, have a minimum of points and hairs, and the figure more correctly represents such. The first lateral spines are represented as coming from blue-black bases, instead of black; otherwise the figure is correct. The figure of the chrysalis is a good one. The larvæ, in But. N. A., are stated to feed on *Dipsacus*, *Castilleja*, and *Lonicera*, but chiefly on *Scrophularia*.

Mr. W. G. Wright, of San Bernardino, in 1883, sent me multitudes of eggs and larvæ. The first larvæ were from *Penstemon antirrhinoides;* others, or eggs, were from *Penstemon ternatum*. On 25th April came about fifty larvæ nearly full grown, a few past third moult, and two which were smaller than the rest, were thought by Mr. Wright to be either *M. Gabbii*, or *Leanira*. They all at last proved to be *Chalcedon*. I put the larvæ in a jar with leaves of *Chelone barbata*, *Actinomeris squarrosa* (on both which *M. Phaeton* feeds) and *Aster*, and an hour later found them eating the first two. On 27th the first larva pupated. They suspend themselves in form of a ring, as does *Phaeton*, also the species of *Phyciodes*. My larvæ did not flourish, and, from the fifty received, there resulted but fifteen pupæ. I attributed this in great degree to lack of sunshine, as Mr. Wright says the larvæ delight in the hottest sun.

On 16th May came four larvæ which Mr. Wright said he had found the preceding fall,—part of a large colony within a web, high on the mountains, not less than about 5000 feet. What species they might be he did not know. Certainly not *Chalcedon*, which butterfly he had never seen at such an altitude. The web was as large as a man's hand, and in it were hundreds of larvæ. Mr. Wright kept the web and contents through the winter, and was much astonished on finding that the larvæ gave *Chalcedon* butterflies; because, in the low grounds, the habits of *Chalcedon* are different from this. Mr. Wright says: "Down in the valley they form into small colonies, and make small webs near the ground, at the ends of twigs, on the lower branches of the food-plant. At third moult, or closely after, they drop to the ground, or run down the stems and hibernate in the ground. The little webs are very inconspicuous; even when there are eight or ten of them on a twig, they are not noticed, except on searching for them, and they are so small that they each hold but few larvæ. Now, apparently, here is a clear case of the influence of climate on the habits of larvæ. Both colonies came out *Chalcedon*, and yet had widely different habits. It would seem as if in the cold altitudes the larvæ ought to hide in the ground, and that in the valley they might be comfortable in a web on a twig, but the case is reversed. How can a colony, passing the winter out on the end of a swaying twig be more protected from the weather than the separated larvæ which hide in the ground." Mr. Wright is a first rate observer, and his remarks are pertinent. I suggested to him that perhaps the answer to these queries would be this: that in a cold latitude or altitude, where there is no danger of the larvæ being prematurely roused from lethargy by excess of heat, a web gives protection from weather, rain, or snow, and also from enemies of some description. In the Eastern States *Phaeton* passes the winter in webs, and on slender plants like *Chelone*, which are broken to the ground. The larvæ, nevertheless, get well through the winter, though for weeks or months covered by snow. So long as larvæ of *Argynnis* are kept artificially in an ice-house, or in a snow-bank, they are healthy. It is the waking up out of season which is fatal to them, starvation or exhaustion being the consequence. On the other hand, where the winter is warm, as in the valleys in southern California, the ground would seem to furnish the most equable temperature. So the species of *Argynnis* and *Satyrus* go to ground and hibernate.

To this Mr. Wright replied: "As to why the lowland larvæ go into the ground, I judge it is because of the heat. The valley where they do most congregate is narrow and sandy, between low, bare hills. About the time when the larvæ go into the ground—say in July—the whole country, valleys and hills, becomes perfectly dry and hot. There is not a tree or bush to afford shade; no water, no grass. For four rainless months the country is thus parched and torrid. It is hot enough there in August to bake the larvæ, if any where above ground. As to the woolly coat, I think it is a protection against water in the wet season. On the other hand the larvæ at 5000 feet elevation, hibernating in their web, would be protected by that against water, and do not need a woolly coat."

In PAPILIO, Vol. III, p. 26, Prof. J. J. Rivers says of *Chalcedon:* "This species hibernates socially *after the first moult*, selecting a place below the radical leaves of cumbrous herbage, from which situation the larvæ do not stir for several months. I have kept them all the winter," etc. I apprehend that for "first" we should read "third."

The four larvæ from the web and the two before spoken of, supposed to be *Leanira*, were alike in that they were nearly naked, whereas the other larvæ were woolly. But one from the web became woolly at last moult. Whether the colony of hundreds were all so thinly clad it was too late to ascertain; but it seemed as if nature, for further protection of the webless larvæ, had given them a good warm fleece in which to hibernate.

From hibernating larvæ I got the stages after fourth and fifth moult. On 5th May, I received about seventy-five eggs, and on 7th, another large lot. These began to hatch on 10th at fourteen or fifteen days from the laying. On June 6th, I received a lot of young larvæ, and at least one hundred eggs. Mr. Wright says: "These eggs are easiest to get of any; the females confined in bags lay all over the bags, or on sticks, and they want no shade. I set the plant close to the window, and the butterflies like the sun and will not lay without it." Following the first lot, of May, I gave the young larvæ leaves of *Scrophularia*, which Mr. Wright had sent me, and which came in good condition, and also gave *Chelone*, and the latter was preferred by them. They were kept in a half-pint glass, and showed a tendency to do much spinning, though not to make a regular web. On 16th, the day being fine, and some larvæ near their first moult, I put several out of doors, on the terminal leaves of a plant of *Chelone*, in my garden, to see their behavior. They at once went to work, and next day had spun together the leaves and were concealed within. Four days later we had a cold rain, and the web was broken, and I could see but two or three of the larvæ; the others seemed to have been swept away. But, on 23d, weather wet and cold, I found the whole colony lying snug between two leaves, as well protected as if under a slate roof. The 24th was fine, and I put out nearly all the remaining larvæ, putting them close by the others, within leaves pinned together. I did this, supposing they would soon find their fellows, and that the two lots would unite. But they continued separate, and formed two light webs, nothing like so close as the web of *Phaeton*. So they passed two moults, adding to the web as it became necessary, taking in one leaf after another along the stem. On 29th came a furious rain storm, and on examining the webs during the storm, the older one was found to be quite empty, the larvæ probably having gone down the stem to ground. The other was broken, and the larvæ were busy repairing, but there evidently were not enough of them to do the work in a proper manner. After this these larvæ gave up living in their web, and returned to it from feeding, gathering in a cluster on the outside. There had originally been about fifty, but they were now reduced to half a dozen; all past third moult. On 11th July there were but two visible, and these I brought into the house and put in glass. One of them shortly after passed third moult, and both soon went into lethargy between two leaves, and are so passing the winter. Part of these larvæ I had kept in the house and followed their stages. In this way I have the complete history, first from egg to hibernation after third moult; then from hibernation to pupation, two moults being passed.

It so happened that I had at same time a lot of *Phaeton* feeding, and under very peculiar circumstances. Formerly, larvæ of *Phaeton* were found in a small swamp about two miles from my house, near the Kanawha River, the only locality in this region known to me for the species. In 1878 came a flood, which exceeded anything known in this valley, overflowing a large part of the river bottoms. This swamp was under water fully two days; several feet under. Any larvæ of *Phaeton* would have been in web, hibernating, the month being August, and no doubt the last one was drowned. And from 1878 to the present time not one butterfly have I seen. About ten years ago I set a plant of *Chelone glabra* in the garden, in order to have food at hand when needed, but it had never been visited by a *Phaeton* butterfly, and as I live on a hill, off the river bottom, I did not suppose the butterfly would ever find it. But on 25th June I noticed a little knot of twisted leaf fastened by a web as large as a filbert, on the plant, and knew it for *Phaeton*. How a stray butterfly should find that single plant, entirely out of its range, is more than I can understand. *Phaeton*, unlike *Chalcedon*, is restricted in its food-plant to a single species, *Chelone glabra*, or possibly two, the other being *Lonicera ciliata*, but on what authority this last has been given I do not know. *Chelone* is the food-plant in this region. Later, same day, the larvæ were observed outside, extending the web, and they were in first stage, very recently out of egg. On 27th the day began with showers, but cleared up in afternoon, and all of a sudden the whole colony was found actively at work. I entered in my note-book that I believe the unusual stir was owing to a change of weather for the worse which these creatures had a prevision of, for I had noticed some years ago, that before a storm great efforts were made by *Phaeton* larvæ to put the webs in order. Two days later the rain came, and this web was tight and all larvæ housed, in contrast to the web of *Chalcedon* on same plant, which was broken by the rain and wind, and the larvæ were out in the rain trying to repair it. By 7th July they had passed second moult. After the first moult, which took place inside the original web, the larvæ moved up the stem and made themselves a new one quite at the top, and there passed second moult. Then they extended the web. In pleasant weather they worked actively, but when rain fell they were all inside. And whatever damage was done they repaired it as soon as sunshine came. On 10th July the web was beaten in pieces by a storm, and next day the larvæ were lying about in great clusters on the leaves. But during the morning they set at work and built a new web, evidently intended as the final one, and for hibernation. Work went on daily, when sunshine permitted, and by 13th the larvæ were inside it. It was double, and three round holes were left on the sides for egress. Early on 14th the rain fell in torrents, and I expected to find the web dashed in pieces. But it was not. At noon not a larva was to be seen, and the web was uninjured. I looked at it daily, but saw no larva thereafter. The holes spoken of were closed by an inner coating, plain to be seen. On 26th I brought the web to the house and cut it open. It was double, the inner part being thin, the outer of a dense texture like thin silk; in parts it was triple. There were the casts of face and body made at third moult, and about fifty caterpillars, lively enough. I removed these with forceps; putting them in paper pill-boxes, and they ran about so fast that I had much trouble to secure all. The same day I sent these larvæ to Dr. Jewett, at Dayton, Ohio, to go in an ice-box, and there they are now wintering.

It will be seen, therefore, that while *Phaeton* and *Chalcedon* are both web builders, there is a difference. The climate of California does not require a web as a protection against rain while the larvæ are in their first stages; whereas in the Atlantic States rain is the very thing to be provided against. One web is slight, therefore, the other close, and the *Phaeton* larvæ have learned to be industrious at the proper season, either when foreseeing damage, or in repairing damage. The lowland *Chalcedon* go to ground for hibernation, not taking the trouble to build webs, but the highland members of the species seem to have found a web most suitable for their requirements, and build one as large and strong as that of *Phaeton.*

Since the foregoing pages were written, Mr. Wright has given me a list of all food-plants of larvæ of *Chalcedon* known to him as follows:

"1. *Penstemon antirrhinoides.*

2. " *cordifolius.*

3. " *ternatum.* It was on this plant that I found a large colony of half-grown larvæ in a web at altitude of 5000 feet or more," (as before related). "This is the only large colony I have ever seen.

4. *Scrophularia Californica.*

5. *Rosa minutifolia*, Engel., a new species, a rose recently found in lower California, where on Jan. 25th, 1883, I found the larvæ feeding. At same time there were others alongside feeding on *P. antirrhinoides.* As this rose is a plant of quite different order from any other in the list, I affirm the fact of such feeding as coming under my own observation.

Dipsacus, *Castilleja* and *Lonicera*, are all found here and known, but I have never seen any larvæ on either of them. Nine-tenths of all the larvæ in this country live on *P. antirrhinoides.* The female lays her eggs upon the upper twigs in masses of 50 to 100, or more. The young larvæ separate into small colonies and build small webs on the outer ends of the lower branches. I am pretty sure that they change their place of abode and build a new web at every moult, but cannot positively affirm that such is the case. At any rate, I frequently see deserted nests with cast-off skins at an early date in the life of the larvæ. At third moult the larvæ disappear, doubtless dropping to the ground, to hibernate at the base of the bush, under leaves and loose soil. In April, they are again seen, solitary, feeding on the fresh leaves of their plant. The chrysalis is found suspended to dry sticks and to stems of other plants, near by."

ON THE DIMORPHISM OF TERAS OXYCOCCANA, PACK.

By C. V. Riley.

The following notes are essentially as they will appear in Bulletin No. 4, Division of Entomology, Dept. of Agriculture:

In the "General Index and Supplement to the nine reports on the Insects of Missouri," 1881, in speaking of *Tortrix cinderella* Riley, we remarked as follows (pp. 82–83):

"From specimens reared from cranberry-feeding larvæ received from Mr. John H. Brakeley of Bordentown, N. J., I am satisfied that this is the same species briefly characterized by Packard in the first edition of his *Guide* (p. 334) as *Tortrix oxycoccana*, and that *T. malivorana* Le Baron (my Rep. IV, p. 47) is but a dimorphic orange form, subsequently described by Packard as *T. vacciniivorana* (Hayden's Report of the U. S. Geol. and Geogr. Survey of the Territories, 1878, p. 522). The orange and ash-gray specimens are thus bred both from Apple and Cranberry. I have reared both forms from Cranberry and from Apple, and they are undistinguishable in the larva and pupa states. The gray form is often more or less suffused with orange scales and the orange form less frequently with gray scales. This is the most remarkable case of dimorphism with which I am familiar in the family, and points strongly to the important bearing of biological facts on a true classification. The dimorphic coloring is not sexual, but occurs in both sexes. The eggs of this species are very flat, circular and translucent, with a diameter of 0.7 mm., and are laid singly on the under side of the leaf near the midrib. The species belongs to the genus *Teras*, and as Packard's specific name *oxycoccana* has priority, the insect should be known as *Teras oxycoccana*, Pack. The insect, according to Mr. Brakeley, who gives an account of it in the Report of the Seventh Annual Convention of the New Jersey Cranberry Association (1879, p. 7), commonly affects, also, the high-bush whortleberry. The gray form of the moth is most frequent in autumn."

Prof. C. H. Fernald, in his "Synonymical catalogue of the described Tortricidæ of North America, north of Mexico," 1882, still retains the four insects as distinct species, and thus doubts the correctness of our conclusions. We therefore took pains to put the question to so full a test as to leave no reason for doubt. The experience of Mr. J. B. Smith, in the field, is confirmatory; but from material which he sent on to Washington, we not only actually bred the orange form from the first brood of larvæ received in May and produced from the hibernating slate-colored form, but also the slate-colored form from larvæ hatched from eggs laid by the orange form. Over two hundred specimens, reared from larvæ received in August, and produced by the second brood of orange moths were all referable to the slate-colored form. In fact all the moths which issued after September 23d were of this form, though there was but a difference of five days between the issuing of the last yellow and the first gray specimens, the latter continuing to issue through October. Many of the gray specimens, especially those which first appear, are so suffused with orange or reddish scales as to appear somewhat intermediate between the two extremes, but there are none which are not at once referable to the gray form. It is in fact an interesting case of seasonal dimorphism, and how far it is influenced by temperature, future experiment, which we hope to make, will determine.

Many species of the genus *Teras* are well known to vary in a remarkable degree, but none other known to me presents such a marked case of seasonal dimorphism.

DESCRIPTION OF A NEW SPECIES OF SPHACELODES.

By W. J. Holland.

Among a number of specimens recently obtained from the Indian River region of Florida are four moths, which I was for some time inclined to identify as *Sphacelodes Vulurraria* of Hübner and Guenée. A more thorough examination, however, leads me to the conclusion that they are sufficiently distinct to deserve a specific name. I append herewith a description:

Sphacelodes Floridensis, n. sp.— ♂. Expands 42 mm. Primaries reddish brown, secondaries slightly darker. About the middle of the costa of the primaries a large, triangular, flesh-colored spot, extending back to the first nervule. Three dark bands, the outermost forming at the costa the exterior margin of the light flesh-colored spot, divide the fore wings into three portions, of which the marginal portion is the largest. The outermost band is curved from the discal region towards the internal angle of the primaries. The basal and median bands are continued over the secondaries, the median band being triply waved and shaded very slightly on its external edge by gray. There is a very obscure, whitish discal spot on the upper surface of the secondaries, and a very delicate gray marginal line disposed in scallops intervenes between the main body of the hind wings and the concolorous fringes. The under surface of the primaries and secondaries are of a uniform, velvety, leaden-gray, with a broad marginal shade of a darker hue. The abdomen and thorax are of the same general color as the upper surface of the wings, a trifle lighter beneath. The antennæ, the head, and the palpi flesh colored, with a yellowish cast, and a trifle lighter than the conspicuous costal spot.

Guenée gives Brazil as the habitat of the two species of *Sphacelodes* described by him, and the presence of the genus in Florida is an interesting fact.

It is but proper to call attention to the fact that Guenée, in his description of the genus *Sphacelodes*, says that it is characterized, among other things, by the absence of the discal spot on the wings. With this exception the insect before me agrees thoroughly with his generic description, and the discal spot is so obscure in a slightly rubbed specimen I have, that its presence would elude ordinary observation. I have no hesitation in referring the insect to Guenée's genus.

It is barely possible that *Floridensis* may prove to be a climatic variation of *Vulurraria.*

Described from 3 ♂ in Coll. W. J. Holland, and 1 ♂ in Coll. J. B. Smith.

———o———

CITHERONIA INFERNALIS AND CATOCALA BABAYAGA, NEW SPECIES.

By Hermann Strecker.

Citheronia Infernalis, n. sp.—♀. Expands 5 inches. Head, body and legs deep orange or brick red, unicolorous, and devoid of all markings whatsoever. Wings on both upper and under surfaces same red color as the body. Primaries, above, slate colored in the interspaces, leaving only the red color visible on the nervures and a narrow accompanying lining; a large red sub-apical blotch or spot at and near costa, also a smaller one midway between it and the inner margin; another still smaller at base of wing as in *Regalis* and *Sepulchralis.* Secondaries with a row of slate-colored sub-marginal spots, and interior to these a row of streaks or dashes of like color. Under surface; primaries much as above, but more of the red ground color prevailing; an indistinct red discal dash. Secondaries with the gray markings only on the apical half of wing; a small, darker, red, discal mark.

Hab.—Maryland, North Carolina.

Described from one female now in my collection, which was bred from a blackish blue larva with shining black horns, after the manner of the other species of the genus. The male I was unable to examine, but was informed it resembled the female.

Catocala Babayaga, n. sp.—Male and female expand from 3¼ to 3⅜ inches. Primaries, head and thorax above, of an even, warm, reddish gray or ash color, quite unlike any other described species, though coming nearer to that of some examples of *Irene* than to any other. The markings of the primaries in the several males in my possession are sufficiently distinct and pronounced, though not intensely defined; in the two females before me they are heavier and accompanied by dark brown shading more or less. The general style of marking is that of *Walshii*, *Arizonæ* and *Aspasia*, to which group it belongs. Secondaries with mesial and marginal bands shaped much as in above mentioned allied species; but the red ground color is far more pinkish than in any of them, and exactly the same tint as in *Amatrix*. The body is, beneath, tawny white, or inclining thereto: the wings differ in nothing decided from allied forms.

This is the insect taken several years since by the indefatigable Jacob Doll in Arizona, and which, by some curious mistake, has been so generally distributed as the *C. Arizonæ*, Grote, from which it is in a moment distinguished by its warm maroon or reddish gray color, whilst in *Arizonæ* the color is, as Mr. Grote says in the description, "dark grayish brown, with a glaucous shade over the more grayish median space."

In *Babayaga* the lines of primaries are reddish brown (an intensification of the paler ground color); in *Arizonæ*, to use Mr. Grote's words in the description, "black." Further, in *Arizonæ*, says its author, is "a whitish shade before the brown-tinged broadly bis-annulate reniform;" there is no vestige of any whitish shade in the remarkably even unicolorous surface of *Babayaga*.

There are other differences of minor importance, but the above, which have been carefully noted with the types of both *Arizonæ* and *Babayaga* before me side by side, will doubtless suffice. The description of *Arizonæ* is in the Can. Ent. Vol. V, p. 163, where any one doubtful of the distinctness of the two, can convince themselves. The original type of *Arizonæ* is in the Museum of the American Ent. Soc. at Philadelphia.

There are five insects in this group, all of a large size, that are easily distinguished from each other, though whether they be of different species or only varieties of one species, is for each one to decide as best may suit his own pet theory in that direction. They are:

Walshii, W. H. Edws., with obscurely marked ashen primaries and brick-colored secondaries.

Arizonæ, Grote, with bluish gray, heavily marked primaries. Secondaries same red as in *Walshii*.

Aspasia, Streck., with very pale, somewhat yellowish gray primaries, with markings not as dark, and scarcely as pronounced as in *Arizonæ*, and secondaries same color as the two preceding.

Babayaga, Streck., with reddish gray primaries and markings of deeper tint of nearly same color. Secondaries bright deep pink, same color as in *Amatrix*.

The fifth one alluded to has not yet, I believe, been described; it comes nearer to *Arizonæ* than to any of the others, but the bluish gray color of the primaries, head and thorax is heavier, darker and of a more even unicolorous appearance, and the markings are not near as distinct and black as in *Arizonæ*, having more of a blurred effect, and in some examples are almost obsolete. Secondaries as in *Walshii* and *Arizonæ*, but of a little deeper tint. Hab.—Colorado.

Of all these five I have examined, and possess large series, and each one holds steadfast to its own type with little or no tendency to merge into either of the others, but that all—*Babayaga* is the most aberrant—are closely allied, and came from one stem, there can not be the least doubt, call them species or varieties or what best suits your notion for the time being.

NOTES ON MEXICAN LEPIDOPTERA, WITH DESCRIPTIONS OF NEW SPECIES.

By Henry Edwards.

(Third Paper.)

Euchætes immanis, n. sp.—Whole upper and lower surface of wings dark fawn-drab, without any markings whatever; the sides and tip of the abdomen are dull orange; the head is cream-white in front, orange beneath the eyes; all else the same color as the wings. 2 ♂.

Exp. wings 60 mm. Length of body 20 mm.

It is possible that this species may form the type of a new genus; the greater size, more produced wings and longer antennæ, with very deep pectinations, inclining me to that conclusion. There is, however, no difference in the neuration, and the coloration is like that of some *Euchætes*.

Halisidota mansueta, n. sp.—Allied to *H. Edwardsii*, and resembling it greatly in point of coloration. The primaries, however, want the dark bands of the California species, and the abdomen is without black spots. The ground color of primaries is fawn-color, made up of minute specks, and traversed by six imperfect, macular bands of pale buff, that behind the cell being the most perfect. These bands are nearly straight, the sub-median being slightly oblique; apices much produced. Secondaries sub-diaphanous, pale buff, stained with rose color, broadly, along abdominal margin. Thorax concolorous with primaries; abdomen very bright rosy red above, buff beneath, and along the sides. Fore tibiæ rose color within, rest of legs buff. The markings of the wings faintly repeated beneath. 1 ♀.

Exp. wings 58 mm. Length of body 20 mm.

Halisidota armillata, n. sp.—Pale buff; the wings shorter and more rounded than in most species of the genus. There is a wide median band of pale brownish, the basal space being also flecked with brown, and behind the band, which is paler on the costa, is an oblique row of spots edged with brown, and another row near margin, neither of which reaches to the internal margin. Thorax and abdomen buff, darker dorsally. All the rest of the insect buff. 1 ♂.

Exp. wings 37 mm. Length of body 14 mm.

Halisidota propinqua, n. var.—I regard this form as a strongly-marked variety of *H. Caryæ.* It is, however, smaller in size, paler in color, the spots of the macular bands much less in size, and the oblique brown line running from the internal angle to near the base of costa, is very dark, and in greater contrast with the ground color of the wing. In other respects I can see no difference from *H. Caryæ.* 1 ♂.

Exp. wings 40 mm. Length of body 15 mm.

Halisidota cinctipes, G. and R.—Several fresh and apparently bred specimens of this little-known species were in Mr. Schaus' collection, and from them I venture to give a redescription. It is allied to *H. Tesselaris,* and is probably the form described by Walker (Lep. Het. B. M. p. 733) as a variety of that species. My copy of the B. Museum catalogue formerly belonged to the late Dr. A. Fitch, and against Walker's description is written in the doctor's hand: "does not at all agree with our *Tesselaris,* it must be a new species." Walker's "variety" is quoted as coming from Mexico and Venezuela. The general color of *H. Cinctipes* is bright buff. Head blackish in front. Thorax with three sea-green stripes, the lateral pair diverging hindward. The primaries have four pale fawn-colored bands, all of which, except the marginal one, terminate on the costa in orange spots, edged with black. The basal band is double, and does not reach the internal margin. It is, more properly speaking, composed of four marks, three of which are transverse, and the other oblong. The second (the median band) is straight, widest on internal margin. The third is oblique, with irregular edges, widest in the middle, and the fourth (the marginal) widens out at apex, and does not reach the internal angle. Between the third and fourth is a divided spot, something like the letter U, orange, bordered with black, and on the costa a triangular spot of the same color. Secondaries pale buff, darker along the abdominal margin. Abdomen concolorous above, pale buff beneath, with a row of small lateral black spots. Pectus and fore tibiæ at base a deeper yellow; hind tibiæ and tarsi distinctly ringed with black.

Exp. wings 58 mm. Length of body 18 mm.

Euhalisidota aperta, n. sp.—Primaries smoky drab, speckled with dull yellowish scales. Secondaries yellowish white, buff at abdominal margin, and smoky at external margins. Beneath, the wings have all a yellow tint. Head and thorax smoky brown; abdomen dull orange at base, smoky brown in the middle, three posterior segments orange, with a row of black dorsal spots; anal tuft smoky brown, as is also the under side of the entire abdomen. Pectus and base of legs dull yellow. 2 ♂.

Exp. wings 46 mm. Length of body 17 mm.

Euhalisidota cervina, n. sp.—Primaries dark fawn-color, with a lilacine tint, the veins all very distinctly marked in a darker shade. Secondaries smoky, lighter at the base, becoming almost sordid white. Beneath, the wings are all dull fawn-color, with a golden reflection. Entire thorax and abdomen bright orange, with a dusky shade on the disc of former, and on the three basal segments of the latter. Head also bright orange, as are the basal joints of the palpi. On the base of the primaries are four black spots, three on front, one on the crown, one on each basal joint of the palpi, and ten on the thorax. There are six transverse bands on the abdomen dorsally, a double row laterally, and ventrally there are three spots. All these spots and bands are velvety black. The tibiæ are orange, the anterior pair black externally, and the posterior pair with black spots on the joints; tarsi all dull fawn-color. Antennæ very long, chestnut brown. 1 ♂.

Exp. wings 48 mm. Length of body 18 mm.

This beautiful and striking insect is placed provisionally in *Euhalisidota*, as structurally it is more like it than any other genus known to me. It is congeneric with *E. aperta* (described above), and it is possible that they may form a new genus.

Apatelodes vivax, n. sp.—♂. Primaries bright reddish brown, mottled with shades of lilac and dark orange. The basal line is white, indented and not reaching the internal margin. Behind it on costa is a lilacine patch of irregular, triangular shape, then a broad, oblique, brown line, bent forward on sub-costal nervure. This is followed by a narrow brown line edged with white towards costa, and very slightly dentate, and the sub-marginal line is black, very deeply dentate. The orange shades are most conspicuous at the base and near the apex. Secondaries chestnut-brown, lighter at the base of costal margin, and with an irregular sub-median band. Fringe of primaries red-brown, blotched with dull yellow; of secondaries, dull yellow towards apex and anal angle, dark brown in the middle. Beneath, the primaries are light fawn-color, darker at posterior margin, with a sub-marginal brown, slightly waved line, and some brown spots near the apex. Secondaries rich pinkish brown, beautifully mottled with chestnut-brown shades, a broad median band of same color not reaching the abdominal margin, a dark sub-apical spot, and some dark patches at the middle of wing. Thorax, abdomen and legs concolorous; the latter, as well as the extremity of abdomen, with many white hairs. 2 ♂.

Exp. wings 38 mm. Length of body 16 mm.

♀. Very different in color, which is here golden testaceous. The lines are all the same as in the ♂, but there are no orange blotches; a whitish triangular patch in the middle of the costa; fringes alternately golden-brown and dull yellow. Secondaries darker than the fore wings, with a still darker median shade. Beneath, the wings are marked as in the ♂, but the shading has an olivaceous tint, and the bands, etc., are not so distinct. Legs, abdomen and thorax concolorous. In both sexes the discal mark is a whitish cloud. 2 ♀.

Exp. wings 48 mm. Length of body 25 mm.

A very beautiful insect, beyond all doubt referable to Packard's genus.

Acronyctodes, n. genus.—Closely allied to *Apatelodes*, Pack., but differs in the following particulars: The fore wings are longer proportionately in their costal length, acutely produced at the apex, without the excavation on margin so visible in *Apatelodes*, and the posterior margin is more oblique to the internal angle. The feet and legs are less densely clothed with hair, and the abdomen is a little longer. Palpi shorter and more slender, and the antennæ with pectinations smaller than in the ♂ of *Apatelodes*, while those of the ♀ have the pectinations longer than the ♀ of *Apatelodes*. Markings somewhat similar, but less pronounced. Hind wings slightly hyaline.

Acronyctodes insignita, n. sp.—♂. Grayish white, with darker markings. A black basal line most apparent on costa; a broad median space, enclosing black discal spot, behind which is a blackish cloud. The sub-marginal line is whitish, edged in front with black, dentated; near its apical extremity are three small almost equal teeth. The space behind this line is grayish, with darker shades, and the terminations of the nervules are marked by black points. Near the apex, and along internal margin are some faint fawn-color shades. Secondaries dull grayish, with a small black discal spot, and a faint median dentated line. Beneath, wholly gray, like many species of *Apatela*, with faint sub-marginal lines, and black discal spots on both wings. Head gray in front; thorax, legs and abdomen concolorous. 2 ♂.

Exp. wings 42 mm. Length of body 25 mm.

♀. Paler gray than the other sex, the thorax and abdomen being sordid white. The markings similar to those of the ♂, but a little darker behind the middle. 2 ♀.

Exp. wings 55 mm. Length of body 25 mm.

Lagoa superba, n. sp.—♂. Primaries bright brown for the basal half of the wing, with a few white streaks at base of costa. Posteriorly the brown shade is encroached upon by a white broad line, strongly dentate anteriorly in the middle, and passing off into narrow streaks behind. The margin is a paler brown than the base, and is clouded with small black blotches. Secondaries the same shade of brown as the posterior margin of primaries. Beneath, both wings are of this pale brown shade, with whitish clouds. Antennæ and head cream-white. Thorax brown, with the collar cream-white. Abdomen with three white dorsal tufts. Under side of body wholly smoky brown. 2 ♂.

Exp. wings 33 mm. Length of body 19 mm.

♀. The primaries are beautifully marked with long, wrinkled, cream-colored hairs along the basal half of costa, and there is a conspicuous brown discal patch not apparent in the ♂. The thorax is wholly cream-white in front; the white dorsal tufts of the abdomen are five in number, and the antennæ are black. In other respects resembling the ♂. 2 ♀.

Exp. wings 53 mm. Length of body 25 mm.

The cocoon of this showy species is spun in a leaf. It is very thick in texture, almost leathery. The hairs of the caterpillar are said to be very poisonous. The chrysalis is very similar to that of *L. crispata*, but it is much larger. Length of cocoon 50 mm. Width 25 mm.

Heterocampa muscosa, n. sp.—Primaries with a decided green cast, mottled with brownish; all the lines, except the sub-marginal, being obsolete, or at least only evident on the costa. The discal mark apparent, small and slightly lunate in form, edged with a pale shade. There is a whitish blotch in the middle of costa, another at the apex, the latter divided by the sub-marginal line. Another white spot at internal angle. Fringe fawn-color, intersected by the brown nervules. Secondaries smoky, darkest at the margins. Thorax concolorous with fore wings; abdomen smoky, greenish at tip. Beneath, the thorax is smoky; abdomen pale buff. Primaries smoky on disc, whitish at apex and along internal margin, with a few dark specks on costa. Secondaries sordid white, stained with dusky at the margins. Tibiæ and tarsi dusky, with darker bands. 1 ♂.

Exp. wings 40 mm. Length of body 18 mm.

Allied to *H. guttivitta* and *H. biundata*, but of a much greener tint, and also distinguishable by the strongly marked white patches.

NOCTUIDÆ.

Plusiodonta effulgens, n. sp.—Rather larger than *P. compressipalpis*, and brighter in color. The ground color of primaries is golden, as in *Basilodes pepita*, with a well marked, rather broad streak of lilacine brown reaching from apex to middle of internal margin. Anterior to this is a brownish shade, which includes the distinct golden reniform, the space around it being covered with brownish scales. Near to the base are two sub-ovate golden spots, surrounded by a brownish ring, and behind the oblique line a long golden streak reaching nearly to apex, and a sub-quadrate mark on internal angle, also golden, surrounded by a brown line. The margins are shaded with golden brown, and the fringe is intermixed with gray. Secondaries and under side of both wings smoky drab, with slight golden reflection. Thorax and abdomen concolorous. 1 ♂.

Exp. wings 34 mm. Length of body 16 mm.

DELTOIDÆ.

Hypena inclyta, n. sp.—Primaries pale golden brown, grayish on costa, and with a reddish tint on internal angle, a pale arcuate median line not reaching the costa, and a sub-marginal line parallel with it enclosing a purplish black discal spot; fringe reddish. Secondaries dark orange, reddish along the external margin. Under side of wings chestnut-brown, paler at base and along internal margin of primaries, and a faint, slightly waved median line common to both wings. Palpi and tibiæ chestnut-brown; abdomen and rest of body paler. 1 ♀.

Exp. wings 40 mm. Length of body 16 mm.

A remarkable species, very different in coloration from its congeners of Europe.

NOTE.—The whole of the species described in this paper were taken by Mr. W. Schaus, Jr., in the province of Vera Cruz, Mexico.

BOOK NOTICES.

CHECK LIST OF INSECTS OF THE DOMINION OF CANADA, COMPILED BY THE Natural History Society of Toronto. Edited by W. Brodie, L.D.S., and J. E. White, M. B., 8vo., 67 pp., Toronto, July, 1883.

LABEL LIST OF INSECTS OF THE DOMINION OF CANADA, COMPILED AND EDITED as above; large 8vo., 70 pp., Toronto, July, 1883.

"In the preparation of this as well as the Label List, the compilers have been actuated by two motives,—the registering of the Entomological Status of Canada to this date, and the furnishing of a reliable Exchange List for the convenience of students and collectors. . . . In the LEPIDOPTERA, W. H. Edwards in the Diurnes, and Grote in the Nocturnes, have been followed." (Preface to Check List.)

The list of LEPIDOPTERA is fairly complete, though the omission of all varieties, and of such species as *Pamphila Cernes*, *Eudamus Electra*, et al., mars it somewhat. As an exchange list its value would have been greatly enhanced by continuous numbering of the species in each order.

But these minor defects are all that the Lepidopterist will notice in the Check List. As for the Label List, which is merely a spaced reproduction of the other, it is all that could be desired in a work of that kind—a kind, however, that is always of doubtful utility.

SYNOPSIS OF THE N. A. SPECIES OF SATYRUS, WEST., WITH NOTES ON THE species collected by the N. Transcontinental Survey. By John B. Smith. From the Bulletin of the Brooklyn Entom. Soc., Vol. VI, pp. 125—135, April, 1884.

In this paper Mr. Smith reduces the 14 species of Edwards' Catalogue and the species (*Paulus*), since described by Mr. Edwards, to six, viz: *Wheeleri*, *Alope*, *Meadii*, *Sthenele*, *Baroni*, and *Silvestris*. Under *Alope* Mr. Smith has placed *Pegala*, *Alope*, and *Nephele* as forms, with *Maritina*, *Texana*, *Boopis*, *Olympus*, *Ariane*, and *Gabbii* as varieties of these forms, and *Incana* as a synonym of *Boopis*.

As is usual, Mr. Smith tabulates the species treated of—a most excellent plan, whereby a few well directed words take the place of much tedious descriptive matter. Nevertheless more minute descriptions, as well as remarks on various intergrades, and on localities, are not wanting. Occasional typographical errors somewhat destroy the sense, as for instance, the occurrence of *from* where *form* is intended, in two or three places. Mr. Smith evidently shares with his fellow Lepidopterists considerable uncertainty as to the proper use of the various terms to be applied to individuals differing from each other in less than a generic degree. Under "var. *Incana*, Edw." (p. 131) he comes to the conclusion that he "cannot believe this form entitled to a distinct varietal name;" but immediately afterwards he tells us that "Mr. Edwards very fully described the larva of this species and some of its varieties." Such slips as these, however, do not materially interfere with the great benefit that is done by a paper of this kind, giving the student, as it does, a clear insight into the modifications of wing-pattern in the genus treated of.

FIRST ANNUAL REPORT OF THE INJURIOUS AND OTHER INSECTS OF THE STATE of New York. By J. A. Lintner, State Entomologist. 8vo., 405 pp. Albany, 1882. (Issued Oct., 1883.)

As was to be expected, this report seems to leave nothing to be desired in its special field. Prof. Lintner begins by calling attention to the importance and value of a study of Economic Entomology, to which subject he devotes twenty-four pages; following with thirty-eight pages on the relative merits of the various insecticides. The chapter on "A new principle of protection from Insect attack," will prove of great interest to all students of life-histories. The new principle proposed is simply the use of certain substances which "shall furnish us *a safeguard against the deposit of insect eggs*." This may be accomplished "by applying to the plant or to the soil certain odorous substances which are popularly believed to be disagreeable to the insect, and therefore, to drive it away. Such substances have been termed 'repellants,' but we doubt that they exert a repellant force, and we believe the name to be a misnomer. . . . . They do so, by giving out an odor overpowering that of the plant (or animal), thereby preventing its recognition by the insect." (pp. 66—67.) Further, on p. 68, Prof. Lintner says: "All the wonderful phenomena attendant upon insect oviposition by selection, may readily be explained under the supposition that it is guided and controlled by the sense of smell." The twelve pages that are given to further consideration of this theory, for it "can only claim, at present, theoretic value" (p. 66, foot note) contain food for much thought, and, we trust, may be the means of exciting a friendly rivalry among all students of Economic Entomology, which shall culminate in the discovery of that "fairy elixir" which, it is claimed, shall so modify insect economy that at last "all life is obliterated and vanishes *in fumo.*" (p. 76)

Of most interest to the readers of PAPILIO will be the chapter on "Injurious Lepidopterous Insects," to a consideration of which eighty-five pages are devoted. The life-histories of the following species are given, together with the best methods for their suppression: *Thyridopteryx*, *Ephemeræformis*, *Tolype Laricis*, *Nephelodes Violans*, *Gortyna Nitela*, *Heliothis Armiger*, *Crambus Vulgivellus*, *C. Exsiccatus*, *Anarsia Lineatella*, *Bucculatrix Pomifoliella*, *Coleophora Malivorella*. Of these species unusually full bibliographies are given, and fifty-eight figures illustrate their various stages. From the pages of PAPILIO and the CANADIAN ENTOMOLOGIST *Thanaos Nævius*, *T. Petronius*, *T. Propertius*, *T. Somnus*, and *Eudamus Electra* are redescribed.

A valuable addition to the work is the Appendix, containing a list of the entomological writings of the late Dr. Asa Fitch. This and the remarkably complete indices make this report a necessity to every student of Entomology, and the manner in which the whole subject is dealt with renders its perusal a positive pleasure.

———o———

NOTES AND QUERIES.

THE ENTOMOLOGICAL SOCIETY OF WASHINGTON has organized with the following officers: President, Dr. C. V. Riley; First Vice-president, Dr. J. G. Morris; Second Vice-president, George Marx; Recording Secretary, E. A. Schwarz; Corresponding Secretary, L. O. Howard; Treasurer, Benjamin P. Mann; Executive Committee, the officers and Dr. H. S. Barnard, P. R. Uhler and Dr. A. J. Shafhart.

The first regular monthly meeting of the society was held April 3d, in the Council Chamber of the United States National Museum. The following papers were read:

1. Some new Facts concerning the late Townend Glover. C. V. Riley.
2. On Insect Collecting at Pt. Barrow, Alaska. John Murdoch.
3. On the Insect Fauna of the District of Columbia. E. A. Schwarz.
4. On the so-called "Mistaken Parasite." L. O. Howard.

The active membership list of the society numbers over twenty names. Regular meetings are held on the first Thursday evening of each month.

L. O. HOWARD, *Corresponding Secretary.*

THE INDEX TO VOL. III.—In reply to numerous inquiries I desire to say that the Index, which is now in course of preparation by Mr. Henry Edwards, will probably be sent out with the June number. Subscribers are reminded that in addition to the fact that the work thereon is entirely a labor of love, the deficit on the last volume will throw the expense of publishing, as well, on Mr. Edwards.

E. M. AARON.

PAPILIO, Vol. IV, No. 3, was published on March 27, 1884.

PAPILIO.

DEVOTED TO LEPIDOPTERA EXCLUSIVELY.

Vol. IV, Nos. 5 and 6.—MAY-JUNE, 1884.

Subscription Two Dollars per Annum (Ten Numbers).

—EDITED BY—

EUGENE M. AARON.

PHILADELPHIA:
Published at the office of
GEORGE B. CRESSON, Entomological Printer,
No. 55 North Seventh Street,
1884.

PAPILIO.

A Journal, devoted to Lepidoptera exclusively, published monthly, July and August excepted. Price, $2.00 per annum. Exchanges of Entomological writings with societies and authors throughout the world are earnestly desired. Advertisements will be inserted on the covers of PAPILIO at the rate of $1 a year for 6 lines or less. Longer advertisments may be contracted for at equally low rates. Sample copies forwarded on receipt of 21 cents. Back numbers supplied. All communications and remittances should be addressed to

EUGENE M. AARON,
Lock Box 916, Philadelphia, Pa.

H. K. MORRISON,

Dealer in Insects of all Orders,

Box 35, Morganton, Burke Co., N. C.

Complete collections, particularly rich in Lepidoptera and Coleoptera, from the following desirable localities:

Key West, Fla., Nevada,
Louisiana, Idaho.

I have at present many rare Lepidoptera from Arizona, and large series of Coleoptera from Arizona, Washington Territory, California, Montana, and North Carolina. Single specimens at reasonable rates, and series offered on very low terms.

Especial care given to making collections to order in any group: larvæ, Micro-lepidoptera, Galls and gall insects, and families to which, in general, little attention is paid. Collections bought. Lists and full particulars in regard to Entomological material on hand sent on application.

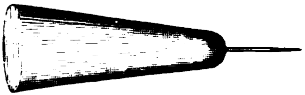
A. W. PUTMAN CRAMER, 51 Douglas Street, Brooklyn, N. Y., wishes to exchange with collectors of Lepidoptera.

The undersigned is desirous of procuring, by purchase or otherwise, the *Ægeriadæ*, *Cossidæ*, *Hepialidæ* and *Plusias* of the world. Asiatic, African and South American forms much desired.

HY. EDWARDS,
Wallack's Theatre,
New York.

B. NEUMOEGEN, P. O. box 2581, New York City, wishes to arrange with collectors in all parts of the world for the collection of Lepidoptera. Will also exchange.

Mr. Fritz Rühl, in Zürich-Hottingen, Switzerland, is prepared to furnish perfect, correctly-named specimens of the insects of Switzerland in all Orders at reasonable prices. Correspondence is solicited.

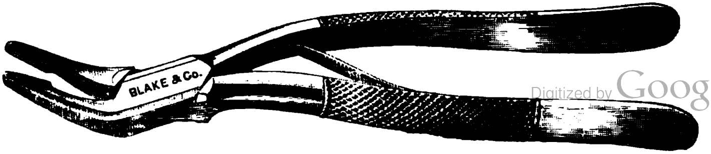


NAT. SIZE.

A new disinfectant for Entomological Cabinets. The material is in the form of cones, cast around a pin, so that they are ready for immediate use; are clean, and occupy very little space. They are highly recommended by Drs. Leconte and Horn, and Messrs. Hy. Edwards, E. T. Cresson, and E. M. Aaron. Price per hundred, $1.00; postage, 10 cents.

ENTOMOLOGICAL FORCEPS.—Designed more particularly for Lepidoptera, but useful for all orders. Price, nickel-plated, $2.50. Sent by mail, on receipt of price.

BLAKE & CO., 55 North Seventh Street, Philadelphia.



HALF SIZE.

PAPILIO.

Devoted Exclusively to Lepidoptera.

Edited by
Eugene M. Aaron,
Lock Box 916.

Philadelphia, November, 1884.

Vol. 4.
Nos. 9, 10.

THE TYPES OF TINEINA IN THE COLLECTION OF THE MUSEUM IN CAMBRIDGE, MASS.

By Dr. H. A. Hagen.

No. II.*

(Not Chambers signifies that the species is not present among Chambers' types.)

LITHOCOLLETIS, Zell.

aceriella, Clem. 2 Ky. (a good spec.)

ænigmatella, Frey. (Chb.) 3 Cambridge, Mass.

æriferella, Chb. 2 Ky. (bad condition; new to me.)

albanotella, Chb. 1 Middle States (bad condition.)

alternatella, Zell. 1 Texas. (not Chambers.)

ambrosiæella, Chb. 2 Ky.

amorphæella, Chb. 1 Col. (bad condition.)

amphicarpæella, Chb. 5 Col. (probably a good species, but the specimens are not sufficient to separate the related species.)

argentifimbriella, Chb. 1 Ky. (very bad condition; perhaps? *longestriata*, Frey.)

argentinotella, Clem.-Chb. 7 Ky. Frey. 8 Cambridge, Mass.

atomariella, Zell. 2 Texas. (perhaps *hamadryella* Clem., but this is still doubtful.)

The same spec. 4 Cambridge in underside mine of *Populus tremuloides;* 4 Cambridge underside mine of *Pop. grandidentata;* 3 Cambridge on *Salix;* all coll. by J. Boll and determined by H. Frey; he adds, "*not*" *atomariella*, Chambers.

auronitens, Frey. Cambridge. (not Chambers.)

australisella, Chb. 1 Texas. (not recognizable.)

basistrigella, Clem.-Chb. 4 Ky. (new to me.)

Bethunella, Chb. 3 Ky. (scarcely recognizable.)

bifasciella, Chb. 1 Ky. (a beautiful spec. entirely different from all European ones.)

caryæalbella, Chb. 1 Ky. (unfit for determination.)

---

* See pages 96–98 of this volume for an explanation of the abbreviations used, and a statement of the condition of these collections.—*Editor*.

caryæfoliella, Clem.-Chb. 4 Ky.
castaneæella, Chb. 1 Ky. (new to me.)
celtisella, Chb. 15 Ky. (new to me.)
Cincinnatella, Chb. 14 Ky (new to me.)
Clemensiella, Chb. 9 Ky. (unfit for determination.)
conglomeratella, Zell. 4 Texas. (not Chambers ; wanting among his spec.
consimilella, Frey. 1 Cambridge. (not Chambers.)
coryliella, Chb. 1 Ky. (unfit for determination.) var. *ostryæella*, Chb.
corylisella, Chb. 1 Ky. (unfit for determination.) from the hazel, Chb.
cratægella, Clem.-Chb. 7 Ky. from quince and wild cherry (new to me.)
deceptisella, Chb. 1 Ky. (not recognizable.)
Fitchella, Clem.-Chb. 2 Ky. Zell. 2 Texas (is *quercetorum*, Frey ; Clemens' name to be retained.)
fuscocostella, Chb. 3 Ky. (new to me.)
gemmea, Frey. 2 Cambridge. (not Chambers ; the specimens are of very light color.)
guttifinitella, Chb. 8 Ky. (new to me.)
Hagenii, Frey. 4 Cambridge. (is *necopinusella*, Chambers.)
hamadryadella, Clem.-Chb. 6 Ky. (a good spec. new to me.)
helianthivorella, Chb. 1 Ky. (unfit for determination.)
intermedia, Frey. 4 Cambridge. (not Chambers.)
longestriata, Frey 1 Cambridge. (not Chambers.)
lucetiella, Clem.-Chb. 2 Ky. (not recognizable.)
lucidicostella, Clem.-Chb. 5 Ky. (a good spec. new to me.)
necopinusella, Chb. 1 Ky. (is *Hagenii*, Frey.)
obscuricostella, Clem.-Chb. 1 Ky. (not recognizable.)
obsoletella, Frey. 3 Cambridge. (not Chambers.)
ornatella, Chb. 6 Ky.; 5 Cambridge. (Frey's spec. is the same, as far as Chambers' specimens allow to judge.)
ostryæfoliella, Clem.-Chb. 2 Ky. (not recognizable.)
populiella, Chb. 1 Ky. (not recognizable.)
quercella, Chb. 1 Col. (new to me.)
(*quercetorum*, Chb. 1 Mo. is *Fitchella*, Clem.)
quercivorella, Chb. 1 Ky.
quinquenotella, Chb. 2 Texas. (new to me.)
Rileyella, Chb. 1 Mo. (a good specimen ; new to me.)
Robiniella, Clem.-Chb. 3 Ky.; Frey. 9 Cambridge. (right.)
salicifoliella, Clem.-Chb. 7 Ky. (Chambers' species is new to me, and therefore has not been described by me; it is very different from *Scudderella*, though I had agreed formerly with Chambers about the identity, as I see now erroneously; *salicifoliella*, is a most beautiful species; the American fauna is apparently very rich for *Lithocolletis*.)
Scudderella, Frey. 6 Cambridge. (not Chambers.)
Solidaginisella, Chb. 1 Ky. (not recognizable.)
Tiliæella, Chb. 4 Ky. (a good spec. new to me.)
Texanella, Zell. 2 Texas.
Tritæniaella, Chb. 4 Ky. (not recognizable.)
Tubiferella, Chb. 2 Ky. (a good specimen.)
Ulmella, Chb. 12 Ky. (a good spec. very nearly related to *intermedia*, Frey.)
unifasciella, Chb. 1 Ky. (new to me.)

Of the *Lithocolletidæ* recorded in Chambers' Index, 58 are in the collection; there are wanting 10 types of Chambers' species, 5 of Frey's and 3 of Packard's. Prof. Frey says: "this about the most important part of the collection. Chambers did not know the larger part of my species."

ELACHISTIDÆ.

TISCHERIA.

ænea, Frey. 4 Cambridge; Chb. 2 Ky.
badiella, Chb. 4 Ky. (new to me.)
Clemensella, Chb. 1 Ky. (unfit for determination.) This species inadvertently omitted in the Index.
concolor, Zell. 1 Texas.
fuscomarginella, Chb. 1 Ky. (new to me.)
heliopsisella, Chb. 2 Ky. (new to me; if at all belonging to *Tischeria.*)
latipennella, Chb. 1 Texas. (unfit for determination.)
malifoliella, Clem.-Chb. 3 Ky.; Frey. 18 Cambridge.
pulvella, Chb. 1 Texas. (new to me.)
pruinosella, Chb. 1 Texas. (unfit for determination.)
quercitella, Clem.-Zeller. 2 Texas, Frey. 3 Cambridge.
quercivorella, Chb. 5 Ky. (new to me.)
roseticola, Frey. 2 Cambridge.
tinctoriella, Chb. 2 Ky.
Zelleriella, Clem.-Chb. 4 Ky.

There are wanting 4 species of the Index.

ELACHISTA.

bicristatella, Chb. 1 Texas. (surely no *Elachista;* genus unknown to me.)
concolorella, Chb. 1 Texas. (no *Elachista;* genus unknown; unfit for determination.)
parvipulvella, Chb. 4 Texas. (no *Elachista;* genus unknown.)
præmaturella, Clem.-Chb. 6 Ky. (3 spec. not recognizable; one not belonging to this species.)
spectrella, Frey mss. 1 Texas.
Staintonella, Clem.-Chb. 1 Ky. (is an *Elachista.*)
Texanella, Chb. 3 Texas. (belongs perhaps not to *Tischeria.*)

There are wanting 8 species of the Index.

ANTISPILA. (not seen by Prof. Frey.)

ampelopsiella, Chb. 3 Ky.
cornifoliella, Clem.-Chb. 1 Ky.
hydrangiella, Chb. 1 Ky.
isabella, Chb. 1 Ky.
viticordifoliella, Chb. 2 Ky.

All specimens in bad condition; one specimen of the Index wanting.

LAVERNA.

(*albocapitella*, Chb. 1 Texas; is *Murtfeldtella* of Index.)
cephalanthella, Chb. 6 Ky.
circumscriptella, Zell.-Chb. 2 Mo.; Zell. 5 Texas.
coloradoella, Chb. 1 Col. (belongs to another genus.)
definitella, Zell. 1 Texas.
erransella, Chb. 3 Ky.; formerly *Perimede erransella* of Index (unfit for determination.)
gleditschiella, Chb. 2 Ky. (belongs not to *Laverna*.)
(*griseella*, Chb. 2 Ky.; is *Murtfeldtella* of Index) (unfit for determination.)
ignobiliella, Chb. 1 Ky. (unfit for determination.)
magnatella, Zell.-Chb. 2 locality? It is different from *œenotheriella*.
miscecolorella, Chb. 8 Texas. (a good spec.)
Murtfeldtella, Chb. 6 Ky. (a good spec.)
obscurusella, Chb. 2 Texas.
œnotheræseminella, Chb. 2 Mo.
œnotherella, Chb. 3 Texas. (all 3 are different species.)
unifasciella, Chb. 1 Col.

Wanting 9 species of Index.

BEDELLIA.

somnulentella, Zell. 3 Ky. (the European species.)

COSMOPTERYX.

montisella, Chb. 1 Ky.
gemmiferella? Zeller. 1 Texas.
quadrilinella, Chb. 2 Texas.

BATRACHEDRA.

(*Clemensella*, Chb.; after a ms. note by Chambers it is *striolata*, Zell.)
præangusta, Chb. 4 Col. (unfit for determination.) Chambers believes his *salicipomonella* to be the same species.
striolata, Zell. 9 Texas.

ÆÆA.

ostryæella, Chb. 1 Ky.
purpuriella, Chb. 4 Ky.; formerly *Chrysopeleia purpuriella*, Chambers.
quadricristatella, Chb. 1 Texas.

AETOLA.

bella, Chb. 1 Texas (a most wonderful species; there exists not anything alike or even related in Europe.)

ASYCHNA.

pulvella, Chb. 4 Ky.

With the only exception of *Bedellia somnulentella* there is no European species among all here recorded.

FOOD-PLANTS OF LEPIDOPTERA.

By Wm. Beuttenmüller.

(NO. I. HYPERCHIRIA. IO.)

I offer the following paper as one of a series on the food-plants of Lepidoptera, which though perhaps by no means perfect, may be relied upon as having been the result of my own personal observations, and which will, I trust, derive value in the eyes of entomologists from the care and accuracy with which those observations have been made. The imported plants mentioned in the list are all to be found in cultivation in Central Park, New York.

Malvaceæ.

Gossypeum herbaceum.	Common Cotton.

Tiliaceæ.

Tilia Americana, L.	Basswood.
" pubescens, Ait.	Hairy-leaved Linden.
" heterophylla, Vent.	Cut-leaved Linden.
" Europeæ, L.	European Linden.
" alba, Waldst and Kit.	White European Lime Tree.

Sapindaceæ.

Acer spicatum, Lam.	Mountain Maple.
" saccharinum, Wang.	Sugar or Rock Maple.
" dasycarpum, Ehrhart.	White or Silver Maple.
" rubrum, L.	Red or Swamp Maple.
" Pseudo-platanus, L.	Mock Plane Tree or Great Maple.
" platanoides, L.	Platanus-like or Norway Maple.
" circinatum, Pursh.	Round-leaved Maple.

Leguminosæ.

Trifolium pratense, L.	Red Clover.
Melilotus alba, Lam.	White Melilot.
Amorpha fruticosa, L.	False Indigo.
Robinia pseudacacia, L.	Common Locust or False Acacia.
" viscosa, Vent.	Clammy Locust.
" hispida, L.	Bristle or Rose Acacia.
Wistaria Sinensis, Dec.	Chinese Wistaria.
Lespedeza hirta, Ell.	Bush Clover.
" capitata, Michx.	Bush Clover.

Baptisia tinctoria, R. Br.	Wild Indigo.
Gleditschia triacanthos, L.	Three-thorned or Honey Locust.

ROSACEÆ.

Prunus virginiana, L.	Choke-cherry.
" serotina, Ehrhart.	Wild Black Cherry.
Spiræa opulifolia, L.	Nine Bark.
Rubus odoratus, L.	Purple-flowering Raspberry.
" villosus, Ait.	Common Blackberry.
Pyrus malus, Tourn.	Apple.

SAXIFRAGACEÆ.

Ribes rubrum, L.	Red Currant.

CORNACEÆ.

Cornus Florida, L.	Florida Dogwood.

CAPRIFOLIACEÆ.

Symphoricarpus racemosus, Michx.	Snowberry.
Viburnum dentatum, L.	Arrow Wood.

OLEACEÆ.

Fraxinus Americana, L.	White Ash.
" pubescens, Lam.	Red Ash.
" sambucifolia, Lam.	Black or Water Ash.

LAURACEÆ.

Sassafras officinale, Nees.	Sassafras.

URTICACEÆ.

Ulmus fulva, Mich.	Slippery or Red Elm.
" americana, L.	American or Wild Elm.
" alata, Michx.	Whahoo or Winged Elm.
" campestris, L.	English or Field Elm.
" montana, Bauh.	Mountain, Scotch or Wych Elm.
" suberosa, Monch.	Cork-barked Elm.
Humulus Lupulus, L.	Common Hop.

CUPULIFERÆ.

Quercus alba, L.	White Oak.
" obtusiloba, Michx.	Post Oak.
" macrocarpa, Michx.	Bur Oak.
" coccinea, Wang.	Scarlet Oak.

Quercus tinctoria, Bart. Quercitron, Yellow or Black Oak.
" rubra, L. Red Oak.
" palustris, Du Roi. Swamp, Spanish or Pin Oak.
" Cerris, L. Mossy-cupped or Turkey Oak.
" " vulgaris.
" " austriaca, Willd.
" " dentata, Wats.
Fagus ferruginea, Ait. American Beech.
" sylvatica, L. Wood or Common Beech.
" var. purpurea, Ait. Purple Beech.
" var. Cuprea, Lodd. Copper-colored Beech.
" heterophylla. Cut-leaved Beech.
" Americana.
Corylus Americana, Walt. Wild Hazel-nut.
" rostrata, Ait. Beaked Hazel-nut.
" avellana. European Hazel or Filbert.
Ostrya virginica, Willd. Hop Hornbeam.
Carpinus Americana, Michx. American Hornbeam.

MYRICACEÆ.

Myrica cerifera, L. Bayberry, Wax Myrtle.
Comptonia asplenifolia, Ait. Sweet Fern.

BETULACEÆ.

Betula alba, L. American White Birch.
" var. populifolia, Spact.
" papyracea, Ait. Paper or Canoe Birch.
" laciniata. Cut-leaved Birch.

SALICACEÆ.

Salix cordata, Muhl. Heart-leaved Willow.
" lucida, Muhl. Shining Willow.
" nigra, Marsh. Black Willow.
" fragilis, L. Brittle Willow.
" alba, L. White Willow.
" Babylonica, Tourn. Weeping Willow.
Populus tremuloides, Michx. American Aspen.
" grandidentata, Michx. Large-toothed Aspen.
" angulata, Ait. Angled Cottonwood.
" balsamifera, L. Balsam Poplar.
" monilifera, Ait. Cottonwood or Necklace Poplar.

GRAMINEÆ.

Zea mays. Common Corn.

ARCTIA GENEURA, Strecker.——Female.

BY G. H. FRENCH, Carbondale, Ill.

I have recently received from my correspondent in Colorado a fine female specimen of this species taken at the same place where I found the male in 1874. As it is the first time I have known of a female being taken a description may be in order.

Expanse 1.65 inches. Head flesh colored between the eyes, orange tinted above, otherwise as in the male. Abdomen the same as the male, but the lateral spots much enlarged, and the anterior edge of joints between these spots flesh color instead of scarlet; the underside of abdomen black, continuous with the lateral black spots, the flesh color on the anterior edge of the joints not reaching the centre. Upper surface of primaries black, this being the prevailing color, marked with flesh color as in the male, but the lines much contracted; the basal half line represented by a dot on the costa and an upward angle on the longitudinal line; the second, third and fourth lines present, but not more than one-half as wide as in the male, the fourth becoming absolete before reaching the hind margin; the lines forming the terminal M also narrow; costal margin black, except where flesh colored by the expanded ends of the lines; fringes black; hind margin flesh colored to the end of second line, the end of the third a little expanded, the rest of the margin black. Secondaries scarlet as in the male, with the same black markings, but these marks are heavier; edge of the wing and the fringe black; the anal spot united with the black edge, the marginal border sending two low teeth between the three large submarginal spots, the elongate costal spot in line with these three united with the narrow black costal border but not, as in the male, with the spot adjoining; the two spots within this row, one on costa and one at the end of cell, are not united as they are in the male; the median row of three spots have the same position as in the male but are a little larger.

Underside of primaries the same as above, the marks more of a nankeen than flesh color, the black a little yellow tinted, the basal third of costal vein yellow. Secondaries as above, the red a little paler, yellow tinted along costa.

Mr. Strecker in describing the male says the fringe is pale yellowish. The fringes of the specimen are distincly black; all the other marks are the same as the male, only in degree, for which reason I doubt not this is the female of *Geneura*, notwithstanding the black fringe. I have another species of *Arctia* from Colorado in which the males have fringe nearly clear white and the female black. A male *Utethesia Bella* has the fringe white, a female blackish on the hind wings. This shows that the color of the fringes cannot be relied on as a specific character in this group.

COLLECTING ON THE GULF COAST OF SOUTHERN TEXAS.

By S. Frank Aaron.

It is the general opinion of collectors in entomology, who have not visited our semi-tropical localities, that the farther South one goes the more rapidly he can wield his net, and fill his collecting boxes. And this is mainly true. There are, however, some exceptions to this; localities where the peculiar climate and vegetation combine to produce rather rare and interesting things, but few in numbers and short-lived at that. Such a locality is Southwestern Texas, between Laredo, 160 miles inland, on the Rio Grande, and Corpus Christi on the Gulf Coast.

Along the Rio Grande, on both the Texas and Mexican sides, is a broad belt of partly sterile land, where little if any grass grows, but instead, great quantities of the common cactus or prickly pear, *mesquite* (a kind of locust), black chaparral, some so-called ebony and yellow-berry bushes, and other scrub vegetation suited to the sandy dry soil. Over this area there is found very little insect life, and it has occurred to me that insects, especially butterflies, dread to cross it, as they would a broad expanse of water. In some places this dead-land belt continues for over a hundred miles from the river on the Texas side. Near the coast it becomes fresher and a little grassy. North of this belt the broad grass pastures begin and there is less chaparral and cactus, till they disappear entirely as one travels up the coast. During the past summer I made my headquarters at Corpus Christi and collected for the most part within a radius of fifty miles to the north and west. Corpus Christi is situated just a little north of the dead-land belt, and being on the coast is surrounded by many broad pastures, but retains much of the dead-land vegetation. Here it is that the collecting may be said to commence, but much depends on whether the seasons are wet or dry. From the middle of March (the time I commenced collecting) to the middle of May it rained a greater part of the time, generally copious showers in the morning and afternoon, with sunshine between. This, with June, was the season for the wild flowers, and we in the Northern States cannot imagine their beauty and variety. However, I would visit large patches and fields full of the most honeyed of them, but few insects could be taken at this season. I can think only of this explanation: before these rains set in there had been a long dry spell, and this had most probably interfered with the preparatory stages; in June the rains ceased, leaving for a time the flowers and blossoms, and plenty of the purest blue sky and sunshine; then came the insects, and through this month and the first two weeks in July my net was kept going vigorously. Then as no later showers had come to keep up the needed moisture, and Old Sol had shone down with all his semi-tropical fury unabated, the blossoms dropped off, the flowers drooped and died, even some leaves of the *mesquite* turned yellow, and the grass literally dried up.

The inland radiation of heat caused a strong wind from the coast, every day from 10 A. M. till midnight, and collecting ceased by reason of the wind on the prairie and of the dried-up vegetation in the sheltered places. There was no marked change of species during the spring and summer; immediate localities had more to do with producing different things. Down the bay coast below Corpus Christi are low bluffs, twenty or thirty feet high, and in many places they have suffered washouts, causing great arroyas, or gullies, extending often several hundred yards back from the beach. These afforded absolute shelter from the strong winds, and were filled with blossoms and flowers in the early half of the season, during which they were excellent collecting grounds. One day in March, in a single one of these gullies, I took species of *Anthocharis*, *Colias*, *Terias*, *Melitæa*, *Phyciodes*, *Synchloe*, *Junonia*, *Neonympha*, *Thecla*, *Lycæna*, *Copæodes*, *Pamphila*, *Amblyscirtes*, *Spilothyrus*, *Pyrgus*, *Thanaos*, *Systasia* and *Eudamus;* about twenty species or more. Afterwards in April, and through the season, *Papilio*, *Pieris*, *Callidryas*, *Kricogonia*, *Danais*, *Agraulis*, *Euptoieta*, *Eresia*, *Charis* and *Pholisora*.

The Nueces River has its mouth within a few miles of Corpus Christi, and by a ride of twenty-five miles in wagon we reached its heavy bottom-land, the first real woods I had seen in this part of Texas. These remind one much of Florida scenery· Along its wild bayous, under its moss-hung trees, and through its acres of palmetto, in the early part of July, I had my best collecting. A short creeping plant, bearing a small white flower, was the principal attraction for the butterflies. On this I took nearly all the genera that I found down the beach, with the exception of *Anthocharis*, *Neonympha*, *Spilothyrus*, *Systasia* and *Eudamus*, but in addition *Nathalis*, *Pyrameis*, *Libythea* and *Achlyodes* and different species of *Synchloe*, *Thecla*, *Pamphila* and *Thanaos*. Also among the timber I found *Grapta* and *Apatura*. On the prairie, during the season of little wind, I found nearly all the fore-going genera, with still different species of *Melitæa*, *Apatura* and *Pholisora*, and within the shade of the motts (small groves) that are here and there over the prairies, I found an occasional *Neonympha*. Along the salt-water inlets of the bay and on the coast-skirting islands, over a kind of flowering salt weed, I caught different species of *Pieris*, *Lycæna* and *Pamphila*, as well as *Charis* and *Agraulis*. Among the moths I took some *Noctuidæ*, *Geometridæ* and many of the smaller forms by sweeping on the prairie, and by lantern at night when it was not moonlight. The very few *Bombycidæ* that I came across were taken singly with the net, most of them on the prairie. No moths responded very well to the most vigorous sugaring.

We took one long trip in a wagon during the last half of June north, along the coast, to the Colorado River (in Texas), and over a hundred miles from Corpus Christi. Here we found broader pastures, more grass and flowers, heavier bottom-lands on the rivers, an increase of live-oak, but little cacti and no chaparral. The fauna was also in a measure changed. On the San Antonio River I found *Neonympha Sosybius* very common. The southern limit of certain species of *Catocala* appeared to be a broad strip of timber a little north of the Mission Creek, south of which I failed to find any of them, though they were moderately common there but rarely perfect. I did not take *Kricogonia Lyside* or *Fantasia* farther north than the Aransas River, and *Synchloe Janais* was found only at Corpus Christi. *Eresia Texana* and *Punctata* were not seen north of the Guadaloupe River, and were most abundant on the Nueces River.

The larger *Hesperids*, such as *Thanaos*, *Eudamus*, etc., were most plentiful north of the Guadaloupe. The rapid changes in the broods of butterflies were worth noting. Some species of *Phyciodes*, *Eresia*, *Thecla*, *Lycæna*, *Pamphila*, *Pyrgus* and *Copæodes* were out all the time, and I did not know how to estimate the number of the broods; fresh specimens always being obtainable during the collecting season. There seemed to be about four broods of *Colias*, *Callidyras*, *Kricogonia*, *Apatura*, etc. Migration, if it may be so called, also claims notice. Twice I observed great numbers of *Kricogonia*, *Colias* and a few *Callidryas* flying northward over a large extent of country; in both cases on the following day I visited the same ground, but only a few stragglers of these species could be found. Where had they gone? In the early season I often noticed that the general direction in which field butterflies were flying was towards the North. In latter August and September the few field butterflies remaining flew in no particular direction. I was informed that in early winter they began to fly southward.

I had the good fortune to become acquainted with a professional hunter, Mr. John Priour, of Corpus Christi, a collector in other branches of Natural History, and with his guidance and pleasant companionship all my collecting trips were made.

◆

DESCRIPTION OF THE PREPARATORY STAGES OF PAPILIO ZOLICAON, Boisd.

By W. H. Edwards.

Egg.—Spherical; smooth; color yellow-green. Duration of this stage about ten days.

Young Larva.—Length .1 inch; cylindrical, the anterior segments somewhat thickened, the back and sides tapering to 13; when at rest the dorsum is hunched, the head bent down; color black; on 7 and 8 a gray-white dorsal patch, sometimes mottled with black; this patch is irregular, but does not descend below the middle row of tubercles; some larvæ have a little mottling with white on dorsum of 11 to 13, or perhaps one or two segments only, and some have one or two white dots on 2 and 3 in line with the upper row of tubercles; the tubercles form three longitudinal rows: one sub-dorsal, one on mid-side, one infra-stigmatal; these run from 2 to 13, on 2 the tubercles of lower two rows being below the lines; the sub-dorsals are large, slender, tapering, those on 3 to 5 and 11 to 13 larger than the rest and of about equal size; from the apex of each rises a long straight black hair knobbed at extremity, and five or six shorter hairs are irregularly placed about the sides on the upper half; the next two rows are of rounded knobs; on the middle one the knobs on the anterior segments give out four hairs each, but after 3, three hairs; on 2 and 3 the hairs are turned forward, but on the remainder are erect; the knobs of lower row are smallest of all, except on 2 and 3, where they equal in size those of the middle row; the hairs as in that row, but after 3 all are turned down; on the anterior side of each knob, and a little above it, are two hairs to each segment; along base of body a tuft of hairs on each segment from 3 to 12; between the sub-dorsals are two rows of tiny points, from 3 to 12, each with one short hair, but on 11 and 12 the hairs are wanting; feet black; pro-legs greenish brown; head rounded, somewhat flattened frontally, bilobed, the vertices well rounded; color shining black; beset with many black hairs from fine points; the scent organs or tubercles from 2 are stout at base, slender, tapering to a point and bent like an ox-horn; color pale yellow. Duration of this stage four days.

After first Moult: length .16 inch; similar shape; color black-brown; on 8 the dorsum and side are white; on 7 partly mingled with black, but sometimes 7 is white also; on the side of 11 and 12 are usually two or three small white patches, but sometimes there is but one on 10 and

11 each, none on 12; on dorsum of 3 one, two, or three similar patches, but sometimes none; the rows of tubercles as before, but all are conical, with hairs from apex and sides; the sub-dorsals on 3, 4, 5, 11, 12, orange at base; the middle row black to base; the lower row orange from apex to base; the double dorsal row of small spines as before, but those on 3, 4, 5 are larger in proportion, the rest minute; on 2 is a black chitinous collar and a compressed ridge in front; this ridge is whitish, in the middle black, and at each end is a large spine in line with the middle row; back of and between these on same segment a smaller pair (in sub-dorsal row); head rounded, bilobed, black, shining, in front face a whitish chevron; surface beset with short black hairs. Duration of this stage three days.

After second Moult: length .3 inch, same shape; color black; the white patch on 7 and 8 as before, variable in same way; so the spots on 10, 11 and 3; the tubercles as before, the orange at base reddish; some larvæ have the middle row orange, but usually it is black; the anterior spines of the two mid-dorsal rows now conspicuous, largest on 4; the other rows either minute or on last segments almost suppressed; head shaped and colored as before, with similar mark in front face. Duration of this stage about three days.

After third Moult: length .54 inch; same shape; color deep brown-black; the patch on 7 and 8 much broken up, and usually restricted to upper part of sides; on 7 sometimes a bar covering last ridge on dorsum; on 8 dorsum mottled black and white; on 11 and 12 each a small round spot in front of and just below the tubercle of middle row; sometimes an additional spot in line with these back of the tubercle; a small patch on 3, sometimes bisected by the medio-dorsal line, and a small spot on side of 2; over shield on 13 a white cross-bar; over feet and legs each a white patch, and a smaller one on each intervening segment; some examples have two small spots on dorsum and one on side of 6; but others have no white spots on either anterior or posterior segments, very little white on 7 and 8, and no white along base (one had white over legs on 7 and 8 only); the ridge of 2 either whitish or yellow; the sub-dorsal tubercles yolk-red at base except behind, where the color is black, but on 7 and 8 the bases are yellow; the tubercles of middle row are large on anterior segments, the rest small, and all have red at base on dorsal side only; those of lower row are minute except the anterior ones, and all are red to base; the tubercles of the dorsal rows are mere points except on 3, 4, 5, and those on 4 are twice the size of the others; head as before with whitish mark in front and a white patch on side cheek.

At 24 hours later: length .6 to .64 inch; the bases of upper two tubercles on 7 and 8 light yellow; the chevron on face yellow, though the cheek mark is white; before end of the stage the length was .7 at rest. To next moult four days.

After fourth Moult: length .8 (all the foregoing measurements are taken at twelve hours from the beginning of the stage, the larva at rest); banded black and pale blue-green, the band in middle of each segment velvety-black, at the junctions dull lustreless black; the spots clear yellow. As the stage proceeds the green has less blue, more yellow, and this shade spreads over the white along base and under surface. In from three to four days the larvæ were fully grown.

MATURE LARVA.—Length at rest 1.5 to 1.8 inch; greatest breadth .28 inch; cylindrical, stout, somewhat thickened on 3 and 4; color green, banded with black; on the middle of each segment a broad transverse velvet-black band, generally reaching to base, variable in width and often irregular, sometimes broken on mid-side in two or three of the middle segments; the extreme ends of each segment bordered by a velvet-black line or narrow stripe; the junctions dull black; the anterior part of nearly all segments yellow-green, the posterior blue-green; the light parts of base whitish blue-green; on under side a broad ventral black band, and the segments 5, 6, 11, 12 are almost wholly black; 2 has near front a compressed square ridge, the top arcuate, the corners elevated into low rounded knobs, the top yellow, the knobs and sides orange; before this is the black ridge in front of the scent-organs which shows two yellow cross-bars on summit; 3 has two rounded ridges, between which is the black band; the front ridge yellow, the other divided by the narrow green band; on the remaining segments to 12 there is but a single broad rounded ridge to each; 13 has a broken black bar on dorsum, over the shield, and one bar on the side; over the pro-legs on 7 to 10 are two large rounded black spots to each; on 5, 6, 11, 12 one large, one small; on the sides of each proleg, as also on that of 13 a black spot; feet black, the ground over them black; in the first part of this stage the sub-dorsal and part of the lateral tuberculations are distinctly seen, but at maturity there is merely a slight rounded sub-dorsal elevation on either side of 3, 4, 5, and on 11 and 12; also on 3 and 4 in each of the two lower rows; on either side are three rows of yolk-red spots, the upper one running from 4 or 5 to 12, the middle row from 2 to 11, in 2 covering the knob on cross ridge; the lower row from 2 to 12; these are placed on the front of the black middle band on each segment, or if the band be broad, near the middle of it; in this last case, they are rounded; but where the band is narrow, a sinus of same color from the front leads to the spot; the spots of sub-dorsal and middle row on 3 and 4 are minute, the first named often wanting on 4 and usually on 3; surface covered with fine short black hairs; head rounded, bilobed, the vertices rounded; yellow in front, yellowish on sides; from the suture at top two black bars pass down, one on front face ending at mandibles, the other down the cheek behind the ocelli; ocelli black on a black patch.

Black Variety.—Extreme: The middle black bands on all segments so broad as to extinguish the white bands more or less completely; what remains of these bands is also broken into short bits over dorsum; a white patch on each segment along base, large over pro-legs. Examples also appear in which the black is less extended, but nearly all the larvæ observed were of the green type in last stage.

Chrysalis.—Length 1.2 inch; greatest breadth, across mesonotum, .48 inch; greatest depth .3 inch; cylindrical, thickest in middle segments; the surface rough, granulated and on all ridges corrugated; head-case produced, ending in two sub-triangular processes which are but little divergent, the space between them incised at a right angle, and the slopes made irregular by one small knob or tooth on each; mesonotum prominent, pointed forward, sub-pyramidal, the top blunt and rough, the edges thickened and rough; on abdomen two subdorsal rows of low blunt tubercles; on fourth segment a cross row of four small tubercles; on the ventral side six small black tubercles between the antennæ and tongue-cases, three on either side in longitudinal row; color light wood-brown, the ventral side of thorax darker, the wing-cases with black lines indicating the neuration of the wings; a slightly darker band than on rest of abdomen along the side from wing-case to last segment.

Or the color is green, the whole dorsal area from mesonotum down being bright yellow over a green ground, which ground shows most clearly between the rows of tubercles on last three or four segments; the tubercles all yellow, and the granulations of surface yellow, head and wing-cases one shade of green with a light brown tint; the ventral side of abdomen yellow-green; no side stripe. Duration of this stage in the only example which gave imago the same year fourteen days. The others hibernated and gave imagos in following spring.

Zolicaon flies at least from Oregon to Arizona and through the Rocky Mountains, being taken occasionally from Colorado to Montana. But it is at home on the Coast. Mr. W. G. Wright, at San Bernardino, is of the opinion that it is a single-brooded species, though now and then an individual is seen as late as July, and it would therefore be of a second brood. But the larger part of the chrysalids hibernate. The flight of the butterfly is in March and April, according to Mr. Wright. I received from Mr. Wright, April 2, 1883, a number of eggs which had been laid seven days before, on carrot, by a female tied over the plant. On the 5th, these began to hatch, and by 7th all had hatched. The young larvæ look like those of *Asterias* at same stage, and behaved in same manner. I noticed one of them in its first day thrust out its scent-organs, on being touched by another larva. (All *Papilio* larvæ, however, have this power from the egg.) By 13th most had passed the second moult; on 15th some were passing the third moult. After this moult varieties were observed, some larvæ lacking the white spots over feet and legs, and on the anterior and posterior segments; on 19th and 20th four had passed the fourth moult, and came up pale green, as did all the other larvæ of that brood; on 29th the first one fixed itself for pupation, and pupated 30th; making the whole larval period twenty-three days.

On April 14th came a lot of eggs on parsnip. All the larvæ of both lots had been fed at first on fennel; later, on parsley also. On May 3d four of last larvæ passed fourth moult, two coming up green, but two black, one of them very black, the bands almost excluding any white, the other less so, the bands not so broad. The usual green was changed to white or whitish. Part of the chrysalids were wood-brown, part green. One imago only came from chrysalis this year, a female, on May 29th, from pupa formed May 15th, and the rest hibernated, giving imagos in March, 1884. Mr. Wright was surprised at hearing of the rapidity of the stages of my larvæ, inasmuch as some retained by him from the lot received by me April 14th did not pupate till June 9th, or one month later than the last of my larvæ. Why this should be so I do not know, as the climate at San Bernardino is warmer than in Virginia in April and May.

The habits of these larvæ were in all respects like those of *Asterias*. They are sluggish at all stages, remaining long in one place, moving merely to feed.

NOTE.—While this paper was passing through the press, I received from Prof. J. J. Rivers, some notes on *Zolicaon* as it appears at his residence, Berkeley, Cala. He says: " Here at the end of April the first appearance of the butterfly takes place, and again in June come fresh examples; and from that time till the end of August fresh specimens occur frequently."

———o———

Steps are now being taken by the American Entomological Society, of Philadelphia, that will doubtless end in the endowment of a permanent Curatorship. This will place the Society in the front rank in this country and entitle it to the first consideration as a worthy beneficiary for Entomological material. As a Section of the Academy of Natural Sciences of Philadelphia the Society has the advantage of a fire-proof building, the benefit of collections and library surpassed by none in America, and, with their own and the Academy's, the most complete Library of Entomological works, as well. These advantages with the endowments left them by the late Dr. Thos. B. Wilson—which enable them to publish their Transactions, and purchase desirable publications, —will place them, so soon as the Curatorship is established, on a firm footing.

ON SOME HISTORICAL ERRORS.

By W. H. Edwards.

In a paper entitled "Contributions from the Trans-Continental Survey. The genus *Colias*," Proc. Bost. Soc. Nat. Hist., vol. 22, December, 1882, it is stated as fact that six of the *Colias* females were "caught in copula;" p. 154. On next page, that "of the six couples collected in copulation, of one the male is *Philodice*, the female *Edwardsii.* Another pair show the male without, the female with, submarginal spots, and a third pair is just the reverse."

On p. 163, under *C. Christina*, we read: "I have two females from Umatilla, Or., and Yakima, W. T., entirely like the figured one" (*i. e.* the one figured in But. N. A., vol. 1). "They were collected among numerous *C. Edwardsii*, and are entirely pale yellow *without a border.* As similar ones with a *faint beginning of a border* WERE TAKEN IN COPULA with *C. Edwardsii*, there *can be no doubt that the females without border belong also to C. Edwardsii.* . . . It would certainly need a stronger proof to consider these males" (the males *Christina* as figured) "as a separate species, *the more so since they are associated with an undoubted female* of *Edwardsii.*" Here are more facts, and from them important deductions are made. The author is endeavoring to argue out the species *Christina*, *of which he had then never seen an individual specimen.* He first asserts that among numerous *Edwardsii* taken was a female *like the one* given on the plate of *Christina* (which has no border to either wing on upper side); then he asserts that *similar* females (that is, two or more) with a faint beginning of a border were *taken in copula* with males *Edwardsii.* These are the facts. The conclusion from the facts is that the female figured as *Christina* is an undoubted female *Edwardsii*, and hence the males figured must also be *Edwardsii.* (Which last does not follow at all, even if the female figured had been an *Edwardsii.*) A species is wiped out, and all because certain *Colias* pairs were taken in copula!* These statements of fact are without qualification, and are made of the author's own knowledge as a member of the expedition.

On the other hand, the author bears hard on me because at one time or other I had allotted certain females to certain males as constituting one species, when all that was known of them was what the dried butterflies showed. He distrusts dried butterflies, and wants facts! On

---

* It is amusing to read in 1885 this emphatic decision as to *Christina*, inasmuch as by the large collections of *Captn. Geddes* and others made in '83, '84, the species has become thoroughly well known, and is as sharply characterized as any species of butterfly on the continent.

p. 152: " A careful study of his (Mr. Edwards') statements about *C. Philodice*, apparently justifies the doubt if other species, some described after a few specimens, are (to be) accepted as reliable species, the more so when the females are considered as belonging to males ONLY for the reason that they arrived in the same lot."

On p. 163: "This species (*Christina*) is described after 4 ♂ 1 ♀ taken at the Portage of the Slave River. That the female belongs to the male seems to be assumed MERELY from the fact that both arrived in the same lot."

On p. 168: "Such SPURIOUS SPECIES, based upon one or three or a few more specimens, *even without any reliable proof that the males and females belong together*, must be rejected by science, as long as their validity has not been shown in an incontestable manner by equally careful experiments as those for *Eurytheme*."

Now in view of these assertions and of this criticism it will naturally be interesting to see how a scientific professor works, and if his method be commendable, the juniors in all branches of Entomology will do well to take lesson from it.

Let us look into the history of this Trans-Continental expedition so far as concerns the Entomological Division. The author of the paper quoted from was the leader, himself a veteran Neuropterist, and was accompanied by Mr. Stretch, an experienced Lepidopterist, and Mr. Henshaw, Coleopterist. In the Report on the Butterflies of Wash. Terr., which appeared in PAPILIO, vol. 2, December, 1882, on p. 149, we are told that the collection of butterflies made by Mr. Henshaw and Mr. Stretch is large, etc. On p. 160: "WE collected at Yakima City, on milk-weed, 4 ♂ 4 ♀ of *Rutulus*." All specimens were collected from June 24th to July 26th. On p. 150: "The preparation and spreading of the butterflies has only been commenced" (when the Report, printed in December, was written).

Any one reading these reports or papers would understand from them that their author must have observed more or less the butterflies treated of as they flew, if he did not take part of them with his own hand, and must have been conversant with whatever was going on through his associates; and when he declares that certain males were taken in copulation with certain females, either saw it himself or was so informed that there could be no mistake about the matter. The personal observations of a collector in the field are of great value, especially where the question of the validity of a species arises, and when an experienced entomologist, even though not a Lepidopterist, told that on this trip six females, *Colias*, had been taken in copulation, that in one case the pair was male *Philodice* supposed to be *Chrysomelas*, as there are no *Philodice* in that region) and female *Edwardsii;* that more than one female *Christina* was taken with males *Edwardsii*, strange as it seemed, I for one had to admit the facts, though of course not the conclusions, for hybridizing between butterflies is not an unknown thing. But later it occurred to me to ask Mr. Stretch for the inside history of this expedition, and what part his chief had in collecting butterflies, and what he saw in the field, and what he himself knew of these facts about copulating of specified males and females. He replied, June 9, 1884, "I went to Washington Territory with Dr. Hagen. By mutual understanding with Mr. Henshaw, I devoted myself to the LEPIDOPTERA and he to the COLEOPTERA, the result being that I collected fully 95 per cent. of the Diurnals. I do not believe that Dr. Hagen personally collected five butterflies on the trip, and *I am absolutely certain knows nothing about them except seeing the dried specimens* (italicised in the letter), for he never saw them while they were being collected, or labeled at night-time, and I had them in my possession until they were delivered to him *en masse*. He was too worn out with the mere effort of moving from place to place to do anything but sleep when he got to camp. . . . *Nor does it follow that because two insects were in one paper they were in copulation when taken. They were sometimes playing together.*"

This is quite another matter! It is manifest that the author of the paper spoken of knew nothing whatever of these butterflies, alive or dead, until he opened the envelopes containing them, some months after the expedition separated. He did not see the insects in the field, he did not see them after they were taken, and he merely received from Mr. Stretch certain packages of dried butterflies. He knew, therefore, just as much about them, and no more, as I knew when I received *Christina* and *Occidentalis* from Slave Lake twenty odd years ago. But although the describing of these species of *Colias* was among the earliest work I did in that way, I correctly mated the sexes, as later observations of collectors show, not *only* and *merely* because they came in the same lot, as Dr. Hagen reiterates, but because of the correspondence in characters and markings in the two sexes of species. And all lepidopterists determine the sexes of species of butterflies thus, when the dried specimens alone are at hand. There is no other conceivable way to do so. But Dr. Hagen did not even suspect that there was some mistake in the matching of his pairs, though in five out of the six cases he says the markings were strikingly different. The last sentence quoted from Mr. Stretch shows how the Doctor came to assume that certain males and females had been taken in copulation; he found the opposite sexes in six of the papers. That was all. If he had had any acquaintance with butterflies he would have suspected there must be an error at first glance.

The outcome of all this is that the facts are baseless and the deductions are in the air.

While investigating in one direction, I thought it well to try another. On p. 158, Proc. Bost. Soc. N. H. under *C. Astræa*, we are told: "I have submitted to Mr. H. Edwards a female of *Edwardsii*, from W. T., with similar color" (*i. e.* to *Astræa*, a species or form tinted with orange over whole upper surface, but so slightly as to be rather buff than orange), "and he decided that it was very much like *Astræa*. *Now this color was prepared purposely. When the specimen was taken, it was put in a freshly prepared* cyanide bottle, which was still damp inside, *so that both hind wings were thoroughly wetted.* The supposed change in the color appeared after the specimen had become dry."*

Observe the circumstantiality of this! A fresh bottle of cyanide was prepared, and a yellow butterfly *known to be Edwardsii* was taken and put in it purposely to change the color. The color was changed from yellow to buff, or pale orange. This example was sent to Mr. Edwards to pronounce upon, and he said "it was very like *Astræa*."

I asked Mr. Stretch what he knew about this "purposely prepared" likeness of *Astræa*, so submitted to Mr. Edwards. He replied that he knew nothing of it, but as Mr. Henshaw used a cyanide bottle, and he himself did not, referred me to him Thereupon I wrote Mr. Henshaw, asking if there was not some error in the statement given by Dr. Hagen, as it reads. He replied June 25, 1884: "In answer to your letter I would say that Mr. Stretch is mistaken in saying that the details given in Dr. Hagen's paper are erroneous. Mr. S. was not present at the time. The bottle was mine, and Dr. Hagen, *on seeing the specimen with the wings wet and soiled*, said *preserve it and we will see if it changes*" (the italics mine . Mr. Henshaw first says the details as given by Dr. Hagen are correct, and then says in effect that they are not correct, inasmuch as the insect was not purposely colored, but accidentally proved to be so. On this, Mr. Stretch again remarks: "Mr. Henshaw broke his bottle and we made a new one, that I know. I did not know the rest. All the same, it was no experiment; we none of us knew positively the names of the *Colias* we were taking; no account was kept of the color of the specimens before they went into the omnivorous bottle, *and consequently no one knows the extent of the change which took place. It was a pure accident, and the change of color was purely based on supposition.*"

It is plain from this that there is not even a certainty that a yellow *Colias* went into that "omnivorous bottle," or that any change was effected at all. All that appears is *that a buff-colored Colias came out of the bottle.* My opinion is that said butterfly came out the same color it went in. The effect of cyanide is not to change the yellow of a *Colias* to buff, but to crimson, blood-red, and no exposure would change all four wings evenly and thoroughly. It would be deeper colored in one place than another, and part would not be colored at

---

*** Dr. Hagen's English is sometimes obscure, but by the "supposed change of color" I understand that the color which it was supposed would appear on treating this butterfly with cyanide did appear. It was a successful experiment.**

all. It is not to be supposed that a cyanide bottle would be so full of liquid as to give an insect a bath. Mr. Grote sent me some years ago an example of *Philodice* colored crimson by cyanide, and which he had recently described in the Buffalo Bulletin as *C. Maria.* This was when the poison was beginning to be used in bottles and he did not suspect the artificial coloration. I had a colored figure made of that example before I returned it. The crimson is unequal over the two hind wings, deep on each in spots, but not in same way or to same extent, and streaks and patches of crimson are mixed with yellow, no pair of wings alike. That is the way cyanide stains a yellow *Colias*, as I have since observed in several instances. I am sorry to spoil a good story, nevertheless!

———o———

THE MULTIPLICATION OF SYNONYMS.—The past twenty-five years has been a period of unremitting labor on the part of the Entomologists of America. Until the beginning of that period they had been content to let their European brethren describe new species and do what little monographing work was done at that time. Since then, especially in LEPIDOPTERA, the great bulk of the new species described as from America, north of Mexico, have been described by American writers. This change has not been due to the fact that the European students were any less anxious to describe the new material, but simply to the fact that increased enthusiasm on the part of the Americans, combined with naturally better facilities for obtaining American specimens has led the latter to assume to themselves the right to give names to everything found in their territory, presumably new. I say "presumably new," for in very many cases, as all are too well aware, the newness has rested entirely on a presumption, unwarranted by the facts. Without mentioning any specific cases I may venture the remark that any student with but a few months' experience will readily call to mind many cases where nothing but the presumption that a species was undescribed has been the excuse for further burdening our already over-taxed synonymical lists. This is especially true of species collected along our southern confines. With such careful and alert students as Godman and Salvin, Oberthür, Staudinger, Mabille, Butler, and many others, always on the lookout for new material, it is an exceedingly difficult matter at the present time to determine, in the Diurnal Lepidoptera, what has been described As it may be of interest to students of the *Rhopalocera* to know the methods used by me for the determination of specimens of this sub-order, constantly coming into my own collection, or those of the Am. Ent. Soc., or The Phil. Acad. of Nat. Sci., I will briefly describe them :

1st.—Kirby's Catalogue of described Butterflies, with supplement to May, 1877, is bound interleaved. On these interleaved pages all species described, from time to time in the publications of the world, are entered as fast as such publications come to my knowledge. This work is facilitated by the "Zoological Record;" and is made possible by the very complete libraries of the Society and Academy, into which nearly all Entomological works of permanent value find their way in time. Opposite these insertions, which now number over 900, and opposite all species previously described, references thereto, published since 1877, are carefully entered. The entries referring to North and Central America alone number considerably over two thousand.

2nd.—A carefully prepared list of all figures, colored or uncolored, in these two libraries, is arranged under generic heads.

3rd.—Tabular statements of many groups difficult to separate specifically, are prepared as needed from time to time.

Thus after much patient toil, in which I have been greatly assisted by my brother, S. F. Aaron, I feel that I am now in a position to offer aid to all who possess undetermined species from any part of the Americas. This aid I freely offer. While not anxious to describe new species myself, I am anxious to amalgamate those already carelessly described, or to prevent, as far as possible, the further manufacture of synonyms. E. M. AARON.

LIST OF A COLLECTION OF DIURNAL LEPIDOPTERA FROM SOUTHERN TEXAS.*

By E. M. and S. F. Aaron.

This collection, made by S. F. Aaron, from March 15th to September 10th, in the Gulf region near Corpus Christi, is rich in species, some of which are scarcely known in collections, a few heretofore undescribed, and in many cases the series of intergrades have proved to be very complete. We have felt that notes thereon would prove of much interest to students of the North American fauna.

——o——

Papilio Philenor, L. Moderately common.

Papilio Asterias, Fab. Occasional.

Papilio Palamedes, Dru. Occasional on the Guadeloupe River, not seen south thereof.

Papilio Thoas, L.

var.—CRESPHONTES, Cram. Common. The typical form *Thoas*, though occasionally found in Texas, was not taken. *Cresphontes*, the common form in the U. S., may be readily told by the macular central band on the primaries; this band is a connected bar in typical *Thoas*. Careful comparison of all illustrations of these forms, and of a series of both, assures us that they can not be separated specifically.

Pieris Monuste, L. Common.

Pieris Protodice, Bd.-Lec. Common.

Nathalis Iole, Boisd. Very common.

The variety *Irene* (which Fitch separated on account of the presence of the black band on internal edge of primaries beneath, the absence of the central dot on same surface, and the broader shade of orange towards base,) was taken in considerable numbers. With these and the typical form many intermediate grades were taken, in fact the intergrades contained by far the greater number of specimens.

Anthocharis Genutia, Fab. Common on the prairies during the first week in April.

Callidryas Eubule, L Occasional.

These specimens from Texas, like those brought from Mt. Graham, Arizona, by Mr. Morrison, would admirably fill the position of connecting links between *Eubule* and *Sennæ* if such were needed between forms separated on inconstant characters. Mr. Butler in his Exotic Lepidoptera has undertaken to separate these species on what seems to us very insufficient grounds.

---

* See article on page 159.

To clearly illustrate this we give here a tabular statement of the two species, *in his own words.*

	SENNÆ.	EUBULE
♂. Size:	Generally smaller than *Eubule;*	
Markings, above:		Unspotted above; narrow, mealy, marginal band;
" below:	The color of under surface deeper; markings much better defined.	below same color as above; a squamose series of spots on secondaries, sometimes wanting; otherwise about as ♀.
♀. color:	Deep golden-yellow to orange or dirty white; abdominal and basal areas of secondaries pale rosy.	Sulphur-yellow.
Above, Margins. primaries:	Front wing internally dentate; well defined margin, dark brown, beginning at second third of costa and terminating at anal angle.	Orange margin; nervules terminating in black spots.
Secondaries:	With rosy margin; submarginal series of fine large geminate dark brown spots at terminations of nervules.	
Markings, primaries:	A large black disco-cellular spot;	With large black disco-cellular spots;
	a sub-apical series of angulated lunules between the nervures;	sometimes an indistinct series of discal spots towards apex.
	a point of same color [black] between median branches.	
Below, color:	Under surface paler; Costa rosy.	Golden-yellow;
Margins:	With bands and spots as above, but deep rosy;	the margins deeper colored [than above];
Markings, primaries:	a large geminate silver-centred ring-spot at end of cell;	a large silver-centred ring-spot;
	and a zig-zag series of irregular characters on disk, all rosy brown.	and a deeply bi-sinuate series of eight red-brown spots beyond it.
Secondaries:	Two silver-centred ring-spots placed obliquely at end of cell on a brownish streak;	Two silver-centred ring-spots placed obliquely upon a squamose rusty band at end of cell;
	encircled by a series of bracket-shaped characters beginning at base and continuing in the form of a heart through disk, all rosy brown.	encircled by a discal series of irregular reddish markings;
		several reddish spots at base.

From the foregoing table it will be clearly seen that the principal so-called points of distinction consist of describing the same characters in different terms. The color character, the most marked difference indicated above, seems to be of about the same value as it is in *Terias Nicippe*, in which specimens grading from pale lemon-yellow to deep orange are frequently found in the same brood.

Callidryas Agarithe, Boisd. Very common.

This is the species found commonly in the southern portion of the U. S. It may be separated from *Argante* (which we have never seen from the U. S.) by the continuous band on the under side of the primaries, (see Edw. Trans. Am. Ent. Soc. IX, 13.) All the females taken were of the white variety; three of them were only 1¾ inches in expanse.

Kricogonia Lyside, Godt., var. *Terissa*, Luc. (Summer form.) Very common.

var. LANICE, Lintn., (Winter form.) Moderately common.

The summer form (*Terissa*) may be told by the prominence of the short black band on the costal edge of the secondaries above, while it is frequently wanting, or nearly obsolete, in the winter form (*Lanice*. Mr. Lintner's type specimen of *Lanice* (♂) which he has kindly sent us is a small specimen of the winter form of *Lyside;* we have specimens that are smaller. As the short black band on the costa of secondaries (*Terissa*) disappears, the presence of the indistinct band of intranervular dusky spots on secondaries beneath *Lanice* can be seen. The type of *Lanice* is a little darker yellow at the base of the wings than our specimens; this may have been caused by cyanide; it certainly has no specific value. We have also many females which agree with the description of *Lanice*. We regret that Mr. Lintner has described this as a new species; we retain the name to designate the winter form.

Kricogonia Fantasia, Butl. Moderately common. Taken during the summer with *Lyside*, var. *Terissa*. *Fantasia* differs from *Lyside* in the general deeper shade, approaching yellow, in the absence of the sulphur-yellow patch at base of wings, by the fuscous apex of the primaries, and by the somewhat nacre reflection of secondaries beneath.

Colias Cæsonia, Stoll. Rather common.

Colias Chrysotheme, Esper. (= *Keewaydin*, Edw.) Common.

var. EURYTHEME, Boisd. Common.

Terias Nicippe, Cram. Occasional.

Terias Mexicana, Boisd. One specimen taken on Guadeloupe River.

Terias Lisa, Bd.-Lec. Common. ♀ var., *Alba*, Strecker, both pure white with no apparent markings beneath, and greenish white with distinct markings, also common.

Danais Archippus, Fab. Occasional.

Danais Berenice, Cram. Occasional.
var. STRIGOSA, Bates. Common.

This variety can be generally determined by the pruinose atoms along the veins on secondaries above, by the somewhat lighter shade of ground color towards the margins of both wings, and by the less spotted black margin of secondaries.

Agraulis Vanillæ, L. Occasional.

Euptoieta Claudia, Cram. Common.

Melitæa Elada, Hew. Common.
Ulrica, Edw.
Imitata, Strecker.
var.—PERSE, Edw. Occasional.

Our specimens of *Ulrica* (= *Imitata*) agree with Hewitson's description and figure of *Elada* beyond a doubt. Godman and Salvin, (Biol. Cent. Amer., Rhopal. Vol. I, p. 196, Aug. 1882) without a large series think that they may prove identical. The only difference between *Elada* and var. *Perse* is the much less diffused and smaller yellow spots, thereby revealing much more of the darker ground color. Specimens of *Perse* from Sonora, Mexico, differ from specimens of the same from Arizona by wanting the double row of fulvous spots before margin of secondaries. Specimens of *Elada* have the two rows distinct. The Sonora *Perse* is darker than the typical Arizona specimens, thereby approaching *Elada* more closely. Godman and Salvin's figures of *Imitata* agree more closely with *Perse* than the typical *Elada* from Texas, but as *Imitata* and *Ulrica* are admitted by the authors of each to be equal the synonymy should stand as above.

Melitæa Albiplaga, n. sp.—(E. M. Aaron.) 1 ♀.

Expanse 1.15 inch. Upper side black with fulvous markings. Primaries with two spots in middle of cell, one over the other, near base two small spots, two others below middle of cell and two oblique spots at end of cell. Across disk a double row of fulvous spots, those towards base oblong, the outer rounded, the two subapical ones small. Secondaries, with a double spot in middle of cell and at the end of cell; a row of small fulvous spots, larger posteriorly, crossing the wing two-thirds from the base. Fringes black with white points.

Under side: primaries mostly fulvous, with a black spot in cell from which extends an abbreviated line towards base and another to inner margin; beyond this a narrow black line across wing, bent outwardly; this line bends abruptly near costal margin and extends across the end of cell, where it again bends and growing broader, reaches the costal margin; outer half of wing with the fulvous markings of the upper side repeated, but larger and more confluent; a marginal row of fulvous lunules, the two at apex largest. Secondaries at base with a white spot on a black stripe, which is narrowly bordered on each side with white; below this a small white spot encircled with black; beyond this a fulvous band crossing wing, then a broad black space containing a fulvous spot on costa, two fulvous spots in cell and between them a white spot, and another fulvous spot below cell; beyond this, reaching nearly to margin is a broad white space, cut by the black nervures; from end of cell to near the abdominal margin extends a wavy black line which cuts off a small portion of the white area; this white area is divided by an irregular black band extending from anal angle to two-thirds the distance to costal margin, followed by five pale fulvous spots; beyond the white area black with a marginal row of fulvous lunules.

Melitæa Dymas, Edw. 1 ♂, 1 ♀. This is Mr. Strecker's *Larunda.*

Melitæa Chara, Edw. 1 ♂.

Melitæa Bollii, Edw. Three examples. One of these, which was identified for us by Mr. W. H. Edwards as *M. Thekla,* is much paler than typical *Bollii,* though more closely related to the latter in markings. A comparison of Mr. Edwards' types, kindly loaned us, shows these two species to be very distinct in general appearance, though the difference appears to be caused entirely by the relative intensity of the markings. A large series will probably prove them to be one species.

Melitæa Definita, n. sp.—(E. M. Aaron.) Moderately common. This species belongs to the *Bollii* and *Minuta* Group (Group III. Edwards' Catalogue, 1885), but may be readily distinguished from its congeners by the two pairs of submarginal brick-colored spots on the secondaries beneath. In its markings above, and in size, it is allied to *Bollii;* beneath it resembles *Dymas.*

Expands from 1.2 to 1.5 inches.

The sexes do not differ in color or pattern. Above, black spotted and banded with deep brick-red. Primaries with two to four spots and a basal dash in the cell, occasionally the latter is nearly obsolete; beneath the cell one or two spots, the inner frequently prolonged into another basal dash; across outer half of wing a double row of oblong spots, the third and fourth, seventh and eighth confluent; a submarginal row of whitish points of which the submedian are the largest, the others sometimes nearly obsolete. Secondaries with the same pattern, the basal area varies from only two small spots in the cell to four therein with a broad dash above and two below; the double row across outer half of wing more clearly separated, the inner occasionally, on both wings, of a lighter color; the submarginal row of white points repeated, and generally more distinct. Fringes alternately white and black.

Beneath: primaries with the markings of the upper side larger and more confluent; the submarginal row of white points much larger, elongate, the median ones conical. Secondaries at extreme base with indistinct white markings surrounded by black, and a red spot on costa; a band of four white spots surrounded by black, followed by a broad irregular red band with a white spot encircled by black in cell; three parallel black wavy lines (the middle nearly obsolete in one specimen) alternating with three rows of white spots, the outer of which is composed of larger spots, the third and fourth, sixth and seventh largely fulvous; a submarginal row of white lunules. Fringes as above.

Hab.—Inland from Corpus Christi.

Phyciodes Nycteis, Doubl.-Hew. North of the Guadaloupe River. Moderately common.

Phyciodes Vesta, Edw. Common.

Eresia Graphica, R. Feld. Verk. k.-k. Zoöl.-bot. Ges. Wien, 1869, p. 470.

var. BOUCARDI, God.-Sal. Rhop. Vol. I, p. 194. Rare.

Godman and Salvin (Biol. Cent. Amer. Rhopal. I, p. 195, Aug. 1882) speak as follows of this species: "Our single Guatemalan specimen we took to Vienna some years ago, and comparing it with the type of *Graphica* found them agree, showing that this name and *Vesta* are synonymous. Which of the two names was first published cannot now readily be determined; but we use Mr. Edwards' title on account of its having become current in literature of North American butterflies."

Mr. Felder's description was read April 7, 1869; Mr. Edwards' was published September, 1869.

Godman and Salvin (p. 194), under the specific heading *Boucardi*, point out the likelihood that this supposed species may be but a variety of *Vesta*, but as their series was a small one they preferred to catalogue them as distinct. The series taken in Texas shows *Boucardi* to be a summer form of *Vesta*. Intergrades between these forms were also taken.

Phyciodes Phaon, Edw. Common.

Godman and Salvin do not mention this species as found in Mexico. It is, however, in the collection of E. M. Aaron, from Sonora, Mex., collected by Mr. H. K. Morrison.

Phyciodes Tharos, Drury. Common.

The typical form and var. *Morpheus*, var. *A.* and var. *C.* (after plate in Edws. Butt. N. Am., Vol. II.) were taken.

Phyciodes Texana, Edw. Common.

Phyciodes Tulcis, Bates. Ent. Mo. Mag., 1, 82, 1865. Nueces Bottoms. Rare.

Eresia Punctata, Edw. (1871.)

The figures of *Tulcis* by Godman and Salvin (Rhopal. I, 203, pl. 22, figs. 1 and 2) and Bates' description agree in every particular with our specimens from Texas and specimens from Yucatan (from Gaumer, in the collection of E. M. Aaron) which have been determined by Mr. Edwards as his *Punctata*. It is closely allied to *P. Ardys*, Hew.

Synchloe Janais, Drury. Common.

Synchloe Lacinia, Geyer, in Hüb. Zutr. p. 25, figs. 899, 900. Common.

Chlosyne Adjutrix, Scud.
Synchloe Mediatrix, Feld.
Synchloe Saundersii, Doubl.-Hew.

Godman and Salvin (Rhopal. I, p. 177, June, 1882) under the specific name *Lacinia*, place *Saundersii*, *Tellias* (Bates), *Quehtala* (Reak.), *Ardema* (Reak.), *Paupera* (Feld.), *Mediatrix*, *Misera* (R. Feld.), *Pretona* (Boisd.), *Crocale* (Edw.), *Adjutrix*, and *Adelina* (Staud.); all of which they consider but inconstant forms of one species. From their superb work we quote as follows: "Between these extremes *Adelina* and *Saundersii*, every gradation of color can be traced and all the rufous markings, as well as the yellow ones of the under side can be exhibited in different individuals from their maximum development till they vanish altogether. * * * In the Southern States of North America a form occurs which is very like *S. Saundersii*, and is prevalent in Texas. This is *S. Adjutrix* Scud., but we doubt the possibility of maintaining its distinction. In Arizona another form occurs, *S. Crocale* Edw., which we take to be undistinguishable from *Adelina*, and therefore connected with the whole series. * * * *S. Mediatrix* comes between *S. Lacinia* and *S. Saundersii*."

Among these Texas captures were *Saundersii*, *Adjutrix* and *Mediatrix;* the latter two were taken in copulation.

Grapta Interrogationis, Fabr.
var. UMBROSA, Lintn. Rare.
Pyrameis Atalanta, Linn. One specimen.
Pyrameis Huntera, Fabr. Common.
Pyrameis Cardui, Linn. Common.
Junonia Cœnia, Hüb. Common.
Apatura Celtis, Boisd.-Lec. Moderately common.
Apatura Antonia, Edw.
Apatura Leilia, Edw.
Apatura Cocles, Lintn.

Our specimens have the basal bar in cell broken as in *Celtis*, to a more or less degree (this character is evidently of no value); the ocellation oval as in *Leilia*, the centers pupiled as in *Celtis*, with three ocellations on under side of primaries and a double ocellus on anal angle of secondaries as in *Leilia;* ground color beneath in most of our specimens as in *Celtis*, while on the upper side it is more like *Leilia;* the space separating the bars in cell on primaries is lighter colored, but varies; spots on upper side of disc distinct, as in both species.

Furthermore, certain of our specimens agree with the description of *Antonia*, and were determined by Mr. Edwards as that species, while others show an absence of the very characters on which Mr. Edwards has separated *Antonia*, viz.: the pupillated spots and the presence of the anterior ocellus on primaries. The general color also varies. In short we have among our specimens a combination and gradation of the characters of all three forms, nor is there a character given in Mr. Edwards' descriptions and superb plate that is not found to be inconstant.

Apatura Cocles, Lintner, described (PAPILIO, IV, p. 141, 1884) from 1 ♀, the type of which has kindly been loaned by Mr. Lintner, is undoubtedly *a* ♀ of typical *Leilia*.

Apatura Clyton, Boisd.-Lec.
var. OCELLATA, Edw. Rare.

Apatura Flora, Edw. Moderately common.

Anæa Andria, Scud. Common.

Our specimens agree with Mr. Edwards' figures of *Glycerium* (But. N. Am. 1, pl. 46). This species it has been pointed out by Mr. Scudder is not *Glycerium* as figured by Doubl.-Hew., and he proposes the name *Andria* for the species common to the United States. Mr. Edwards, in his latest Catalogue, places his *Glycerium* and Scudder's *Andria* as synonyms of *Troglodyta*, Fabr.; he has also determined our specimens for us as that species. But *Troglodyta*, however, is known to be synonymous with *Astinax*, Cram., and *Astina*, Hüb.; unfortunately the description of *Troglodyta* and the figure of *Astinax* are too imperfect to be of any use, hence we have had to depend on the excellent figures of *Astina*, in Hübner's Sammlung. From these figures our specimens differ in a marked degree, and we therefore have no hesitation in adopting Mr. Scudder's name.

Mr. Scudder in his Historical sketch has pointed out the fact that the generic name *Paphia* must be abandoned to the use of the MOLLUSCA, where it was first used.

Neonympha Gemma, Hüb. Three specimens.

Neonympha Sosybius, Fabr. Common. San Antonio River and northward.

Libythea Bachmani, Kirtl. 1 ♂.

Libythea Larvata, Strecker. Very common.

Our specimens agree thoroughly with Mr. Strecker's most excellent description. Cramer's figures are usually worthless for purposes of identification, but in this case they are sufficiently accurate to enable us to separate this species from his *Carinenta*.

Charis Cænius, Linn. Very common.

Thecla Halesus, Cram. 1 ♀. Nueces River.

Thecla Melinus, Hüb. Common.
Thecla Humuli, Harr.

A very careful examination of a large series from all parts of the United States fails to show any difference by which *Melinus* and *Humuli* can be separated even as varieties.

Thecla Blenina, Hew. Common.
Thecla Siva, Edw.

Our specimens agree with Hewitson's figures and descriptions and with specimens of *Siva* from Arizona, determined by Mr. Edwards, and also with his description. They were returned by Mr. Edwards as his *Castalis*, but the absence of the white spot at the base of secondaries beneath separates them therefrom.

Thecla Poeas, Hüb. Very common.

Thecla Clytie, Edw. 3 ♂.

Probably equals *T. Adria,* Hew., but with such limited material we cannot decide.

Thecla Leda, Edw. 1 ♀.

Lycæna Isola, Reak. Common.

Lycæna Alce, Edw.

There are no differences to be found in the description of *Isola* and *Alce.* Our specimens, of which we have a large number, entirely agree with both descriptions, and also with specimens of *Alce* from Arizona, determined by Mr. Edwards.

Lycæna Cyna, Edw. 1 ♀.

This species was described from one ♀, captured at San Antonio, by the late Mr. Boll. Until the capture of the specimen now under consideration the type has remained a unique in collections. Our specimen agrees perfectly with the very complete description.

Lycæna Antibubastus, Hüb. Common.

Lycæna Filenus, Poey.

Rusticus Adolescens Hanno, Hüb.

Lycæna Exilis, Boisd. Very common.

Ancyloxypha Numitor, Fabr. Moderately common. Collette River.

Copæodes Procris, Edw. Not common.

var. WACO, Edw. Common.

The variety *Waco* may readily be distinguished by the lighter colored striæ on the secondaries beneath.

Pamphila Campestris, Boisd. Very common.

Pamphila Huron, Edw.

A large series taken. These specimens compared with a very large series from New Jersey to Texas and Illinois to New Mexico confirm an opinion long held that the species described as *Huron,* by Mr. Edwards in 1863, is in every particular identical with Boisduval's *Campestris,* described in 1852.

These series, embracing perhaps 300 examples, fail to exhibit any marked difference that will warrant their separation as varieties, as is done by Mr. Strecker in his Catalogue; much less can they be separated specifically, as is still done by Mr. Edwards in his recent Catalogue. In our collections will be found specimens from San Bernardino, Cal., Waco, Texas, and Maryville, East Tennessee, examined by Mr. Edwards and labeled by him "*Campestris,* Boisd."

Pamphila Phylæus, Drury. Exceedingly common in August.

Pamphila Brettus, Boisd.-Lec.

var. BRETTOIDES, Edw. 1 ♂, 2 ♀.

This variety may be distinguished by its wanting the row of fuscous markings near outer margin on the under side. The female does not differ. A male specimen from Texas, from the late Mr. Belfrage, serves as a connecting link.

Pamphila Otho, Sm.-Abb. 3 ♂. Collette River.

Pamphila Osceola, Lintn. 1 ♂.

This species is placed as a synonym of *Vestris*, Boisd., in Mr. Edwards' recent Catalogue. It is now known by a few examples from Florida, Colorado, Texas, and California.

Pamphila Panoquin, Scud. 2 ♂.

Pamphila Ethlius, Cram. 3 ♂, 1 ♀.

Pamphila Iowa, Scud. 1 ♀.

This species has long been catalogued as *P. Vitellius*, Sm.-Abb., erroneously as we believe. Smith and Abbott (Vol. 1, p. 33) speak as follows of this species: "Having no mode of determining this fly but by the description of Fabricius, nor any figure to refer to, we have thought it best to affix a mark of doubt, though the characters agree well with Mr. Abbott's drawings; but in so intricate a tribe even the best descriptions, such as those of Fabricius really are, will not always be sufficient."

Fabricius' description, in ten words, would indicate any one of a dozen of our American Hesperids; fortunately Hübner has given us an excellent figure of Fabricius' *Vitellius*, and this figure shows it to be nothing else than *Delaware*, Edwards. This being the case *Vitellius*, Sm.-Abb., should be abandoned, and *Iowa*, the name proposed by Mr. Scudder take its place.

Pamphila Eufala, Edw. Not common.

Pamphila Fusca, Gr.-Rob. Common.

Pamphila Comus, Edw. Moderately common.

Pamphila Eos, Edw. 3 examples.

This and the preceding species are very closely related; at first sight, unless the specimens are in very perfect condition, they are likely to be mistaken for the same species. Though different specifically they should be placed one after the other in a Catalogue, and not separated generically, with such widely separated species as *P. Hianna* and *P. Viator* intervening, as is done by Mr. Edwards in his latest Catalogue.

Pamphila Nysa, Edw. Common.

Pyrgus Tessellata, Scud. Very common.

Though this species has been known to students from the time of Fabricius, and has doubtless been described under at least six names, there has never been an accurate figure of it published. It seems to be impossible to bring order out of the chaos created by the brief and insufficient descriptions by Fabricius and others; therefore there is no recourse but to retain the name proposed by Mr. Scudder, nearly one hundred years after Fabricius' description of *Syrictus*.

Pyrgus Locutia, Hew., Exot. But. vol. 5, pl. 2 of *Leucochitonea*, figs. 19, 20, 1875.

This species is described as follows, by Mr. Hewitson:

"Upper side white, with the apex and outer margin brown. A subapical spot and some minute spots near the outer margin white. Posterior wing with the outer margin and spots at the end of nervules brown.

"Under side. Anterior wing as above. Posterior wing with a large bifid spot at the base of the costal margin, a small spot at the middle of the abdominal fold, and the outer margin, which is broad, rufous-brown.

"Expands 1.5–20 inch. Island of Taboga, Panama."

Thanaos Juvenalis, Fabr. Three specimens.

We place these specimens under this species with some hesitation. Unfortunately they are not perfect examples, nor are they in sufficient numbers to use for study in this most puzzling genus.

Thanaos Tristis, Bosid. Moderately common.

Nisoniades Funeralis, Lintn.

The characters on which Mr. Lintner separates his *Funeralis* from *Tristis*, viz.: the absence of the discal spot on the primaries, and the presence of the clear white border on the secondaries, are seen to be of no value when a series is under comparison. These specimens from Texas show that intergrades are the rule, not the exception.

Systasea Zampa, Edw. Moderately common.

Pholisora Catullus, Cram. Common.

Pholisora Hayhurstii, Edw. Moderately common.

Spilothyrus Nessus, Edw. Moderately common.

Achlyodes Thraso, Hüb. Common.

Eudamus Pylades, Scud. 2 ♀.

Eudamus Bathyllus, Sm.-Abb. 1 ♂, 2 ♀.

Eudamus Tityrus, Fabr. 1 ♂.

Eudamus Proteus, Linn. Moderately common.

Eudamus Simplicius, Stoll. 1 specimen.

Eudamus Albofasciatus, Hew. Moderately common.

Mr. Hewitson, (Desc. 100 New Hesp. p. 3) describes this species as follows:

"Upper side dark brown. Anterior wing with eight transparent spots; four forming a central band (the lowest spot very minute), one outside of these, and three in a band before the apex. Posterior wing with a very long tail.

"Under side. Anterior wing as above, except that it is gray near the apex, and marked by a triangular dark brown spot. Posterior wing dark brown, crossed obliquely by a central band of white; a submarginal band of gray.

"Expanse 2 inches.

"Habitat.—Guatemala (Polochic Valley)."

Three or four new species of *Hesperidæ* were also taken; they will be described in subsequent papers of a monographic nature.

HÜBNERIAN!

By John B. Smith.

Hübnerian and anti-Hübnerian! These terms express the feelings of two camps into which Lepidopterists have long been divided, and most of them adhere to one or the other of these views, without having had an opportunity to fairly examine and judge. Between unqualified blame, and unqualified praise, students have been at a loss; and with a feeling of uncertainty one student writes *Agrotis*, Hb., while another writes *Agrotis*, Tr. Hübner's *Coiti* have become a bye-word, and his "genera" have been abused up hill and down dale. But does Hübner deserve such treatment?

Hübner when he started, found the LEPIDOPTERA in a decidedly mixed condition, and being of a systematic turn he began arranging matters, and did a perfectly astounding amount of work in the way of describing and figuring species, arranging them according to his own views on the subject. In the "Verzeichniss bekannter Schmetterlinge" Augsburg, 1816, there is perhaps as good an opportunity of learning what Hübner's ideas on classification were, as in all his other works combined. An abstract of some portions I give here.

Primarily he divides the LEPIDOPTERA into nine PHALANGES which he defines as follows, though in a different form:

Antennæ obviously clavate at tip; tongue spiral; body short, wings large. I. PAPILIONES.
Antennæ not clavate; with leaf-like appendages to the joints; mouth and tongue prolonged, the latter spiral; primaries long, narrow; secondaries short, broad; body long and thick . . . . II. SPHINGIDES.
Antennæ setaceous, but feathered; head small; tongue short and weak, palpi sub-obsolete; legs small; body hairy . . . . III. PHALÆNÆ.
Antennæ setaceous.
  Tongue moderate, strong; palpi projecting into a blunt snout; collar and pategiæ large; thorax basally clothed with dense scaly hairs; wings fringed; legs spurred . . . . IV. NOCTUÆ.
  Tongue moderate but soft; antennæ delicate; palpi short; body smoothly scaled; wings large; legs rather weak, but with long spurs; abdomen slender . . . . V. GEOMETRÆ.
  Tongue moderate; eyes large; palpi long; wings large, but the primaries longer than secondaries; legs, but especially the tarsi, very long; abdomen elongate, slender . . . . VI. PYRALIDES.
  Palpi short and broad; primaries short, narrow, obtuse; secondaries rather short; legs and abdomen short . . . . . . VII. TORTRICES.
  Palpi prominent; head tufted; wings peculiar in various ways. VIII. TINEÆ.
Wings divided; legs long; abdomen long and slender . X. ALUCITÆ.

Compared with our later-day classifications Phalanx I equals our *Rhopalocera*. Phalanx II equals the *Sphinges* of Staudinger, including *Sesia* and *Zygæna* with their near allies. Phalanx III nearly equals the mass classed as *Bombycidæ*, including however, a few now referred to the *Noctuidæ*. IV contains the larger part of what are now classed as *Noctuidæ* with an occasional Bombycid intermixed. V very nearly equals the *Geometridæ* of to-day. VI includes the Deltoids, many of the lower *Noctuidæ*, and the true *Pyralidæ*. This phalanx was to Hübner what the *Molluscæ* were to Linné; everything not otherwise referable found a place here; and this is the most mixed of all the phalanges. Not that he deserves blame for considering the Deltoids as *Pyralides*, for Guenée does the same thing, and some authors, among them Dr. Packard, still join them. VII nearly equals the present idea of the *Tortricidæ*, while phalanx VIII, despite its peculiar definition, still nearly corresponds to our *Tineidæ* or *Tineinæ*, as some prefer. Phalanx IX includes our *Petrophoridæ* and *Alucitæ*.

It will be seen from the table that Hübner used only the most superficial characters to define his principal divisions, being in that respect no better, and certainly no worse than his predecessors, and indeed to this point there is little original except the term for the divisions.

Each phalanx is divided into *Tribes*, which nearly equals the term sub-family as used to-day. The tribes are divided into *Stirpes;* these are divided into *Familiæ* which are finally divided into *Coiti*. Each division is defined, the definition of the most superficial description, of course.

Some excerpts from the classification of phalanx IV may serve as an illustration.

This phalanx is divided into three tribes as follows:

Body, head, abdomen and legs coarsely clothed, wings gray, primaries with scarcely distinct orbicular, reniform and wavy transverse lines. 1. BOMBYCOIDES.
Collar and pategiæ evident; primaries very variously colored and marked, secondaries uniform, generally pale . . . . 2. GENUINÆ.
Palpi ascending and pointed; both wings ample, very variously colored and marked . . . . 3. SEMIGEOMETRÆ.

Despite the curious definitions the essential meaning or intent is sound, for the Noctuids divide into just such groups—Deltoids of course excluded.

The *Bombycoides* embrace but a very small number of species and are divided into three stirpes.

Palpi short, black marked; primaries rather narrow, pale in color, with grayish transverse shades and lines; secondaries almost without maculation. 1. APATELÆ.
Head, thorax, wings and legs distinctly marked, and handsomely variegated. 2. DIPHTHERÆ.

Thorax humped, the vestiture tufted; primaries dentate, with a widely curved black t. p. line; else blotchy (scheckig bezeichnet) . . 3. JASPIDIÆ.

Hübner was thus the first to associate these forms, and so they remain to this day, all the names being in use.

The *Apatelæ* are divided into three families: A, *Miræ* with narrow primaries, very short secondaries, and long abdomen; B, *Perconformes* with somewhat broader primaries, maculate with sagittate marks; and C, *Consimiles*, with distinct ordinary spots and lines, gray.

To the *Miræ* he refers a single Coitus, *Excæreta* for *Acronycta ulmi*. To the *Perconformes* he refers four Coiti, *Hyboma* for *A. strigosa* (body slender, primaries pale spotted, with darker ground); *Triæna* (pale species with *psi* mark and sagittate dashes) for *tritona* and allies; *Jocheæra* (with sagittate marks, rather distinct stigmata and variegated marking) for *alni*; and *Acronicta* (white with only interrupted black marks) for *leporina* and *bradyporina*. All these species are to-day classed as either *Apatela* or *Acronycta*, though Mr. Grote not long since revived some of the coiti names to designate divisions of the genus.

The *Consimiles* contain three coiti; *Calocasia* for *Demas coryli*, and another; *Pharetra* for *auricoma* and *menyanthidis*, and *Arctomyscis* for *aceris* and allies.

This illustrates the character of Hübner's work. His idea plainly was to form assemblages of related forms, and in a very large proportion of cases he was remarkably successful.

Except for the genus *Calocasia* (*Demas* St.) the entire stirps *Apatelæ* is now referred to *Acronycta*. They form an assemblage somewhat variable in color and habitus, and these differences are seized on to mark families, to which he gives names expressive of some attractive or marked feature, such as *Miræ*, *Maculatæ*, *Clarocoloratæ*, *Nubilæ*, etc.

Finally come his coiti, which correspond to our genera. Rarely has he a coitus name like that of the stirps. Thus he says stirps *Apatelæ*, but nowhere does he have a coitus *Apatela;* while he has a coitus *Acronictæ*, and writes *Acronicta leporina*. The coiti rarely contain heterogeneous material, though not rarely a family corresponds to a genus of to-day. In descriptive work Hübner uses terms like the following: say for *Drasteria cuspidea* "A noctua semigeometra and Euclidia maculata;" giving the phalanx, tribe, stirps and family as descriptive terms; *Drasteria* being the coitus. Carefully examining Hübner's works it will be found that he had for *coitus* the idea we have for *genus*. *Familia* represents a simple group of allied coiti or genera, and family terms are used over and over again. A *Stirps* represents to him an association of similar families, while a *Tribe* represents our present idea of sub-family.

The term "stirps" did not have for Hübner that meaning that the term genus has with the latter-day Entomologists, and his terms for stirpes should not be used for genera; his coiti, where used, should be credited to him, for the names were first proposed by him, and the coiti such as they are, are as well defined as genera usually were in those days. Hübner's language was peculiar, and his classification was based on superficial characters—but he was in advance of his contemporaries in his arrangement and classification, which is fully equal if not superior to that of Entomologists of greater repute. Why, for instance, should Hübner's genera be rejected or credited to others, while Guenée's genera, in the *Tortricidæ* for instance, not sanctioned by a word of description are adopted without question and credited to him?

I do not desire to convey the impression that I advocate the adoption of Hübner's genera—not so. I believe that where an author has subsequently correctly limited and accurately defined a genus his name should be adopted and Hübner's coiti cited as synonyms. What is objectionable is, that coiti names are used in the same sense that Hübner used them and credited to others. It is allowable, where one of Hübner's stirps names is used for a genus, that it be credited to the one that first used the name in a generic sense—thus *Apatelæ* is a stirps name, and the genus *Apatela* is not Hübner's. *Agrotes* is used for a stirps, and *Agrotis* as a genus is properly credited to Treitschke. This leads to a consideration of the Tentamen, and this is entitled only to consideration as what it purports to be—a proposed classification. None of the divisions are defined, and only stirpes are proposed, which should never be used as genera for the reasons above stated. Verzeichniss names, where they refer to good genera ought in justice to be adopted as far as possible.

A settled nomenclature is desirable and necessary, and in the course of the work on the monograph of the American Noctuidæ at which Prof. C. V. Riley and myself are engaged, the consideration to be given to Hübner's works will be carefully discussed.

The above represents extracts and notes made, but not conclusions reached.

* * *

EDITORIAL COMMENT.

For several years the question of publishing an American magazine devoted to general Entomology has been under discussion through the medium of private correspondence among leading friends of science. This question was brought before the Entomological Club of the American Association for the Advancement of Science, at their last meeting, in Philadelphia, last September. A committee appointed to consider this matter (*Psyche*, *The Bulletin of the Brooklyn Entomological Society*, and PAPILIO were represented by their editors) reported adversely; not so much on account of their disapproval of the plan, as on account of their unwillingness to commit the Club to what in their opinion could not fail to prove a failure.

Before this meeting PAPILIO, so far as its present management was concerned, was doomed. An appeal to its subscribers, two months before, not for alms, but for money justly its due, had been answered by the receipt of the money owed it by three subscribers; in other words *the princely sum of six dollars* had been added to its treasury, though much over $150 was needed, and nearly $200 was due.

It was, therefore, with much pleasure that the editor was informed by the representatives of the Brooklyn Society that they stood ready to publish a monthly devoted to general Entomology, provided PAPILIO would discontinue, and would hand its subscription list over to the new journal. This was immediately agreed to; it was a great relief to look forward to such a speedy termination of a very unpleasant undertaking, viz. : giving alms to those who needed it not.

Since that agreement two numbers of *Entomologia Americana* have appeared. It bids fair to be a valuable addition to the list of Entomological periodicals, and we trust that the subscribers to PAPILIO will do all in their power to aid it. It is not, as some suppose, a successor to PAPILIO; it is simply a new periodical which will attempt to satisfy the same want that was filled by this journal. This it can hardly expect to do; it will not have the room for papers on LEPIDOPTERA alone that has been afforded by PAPILIO, as it will contain but few more pages than this journal, and as *Coleoptera* and the other orders are to be placed on an equal footing with LEPIDOPTERA. In this respect it will follow its predecessor, *The Brooklyn Bulletin;* we may be pardoned, however, if we express the hope that in matters of typography and attention to the printers' art it will more closely follow PAPILIO than any other model that it may have before it.

With this number PAPILIO ceases to exist. Its editor, being a young man, hopes to live many years to remember with gratitude the many expressions of appreciation and words of cheer received from his supporters; he also hopes to live to forget entirely the names of those whose indifference to their obligations has made his brief experience in scientific journalism so unpleasant. To the latter he has nought else to say; to the former he hopes occasionally to speak in the pages of *Entomologia Americana.*

CORRECTION IN DR. GRUBER'S PAPER.

In this volume, pages 83 and 115 and illustrated article (Plates 1, 2 and 3) from the pen of Dr. A. Gruber, is translated from the

Since the publication of the translation we have received an author's extra, through the kindness of Mr. W. H. Edwards, of a correction made by Dr. Gruber in the *Jena Zeitschrift*, Bd. XVIII, N. F. XI, of which the following is a translation: EDITOR.

I owe it to those who have taken an interest in my efforts, to make a slight correction in my article "On the Caterpillars of N. Am. Papilionidæ and Nymphalidæ," (a translation of which appeared in this journal). I described the caterpillar represented in Fig. 17, Pl. VII, as the Second Stage of *Papilio Ajax*, but incorrectly; it is only a larger example of the First Stage, which had been wrongly marked. Mr. W. H. Edwards, of Coalburgh, from whom I obtained the described caterpillars, kindly called my attention to this error, and sent me a few examples of the Second Stage. I am thus enabled to offer the following changes in my description: *Pap. Ajax*, Second Stage: the color is still dark; the skin appears smooth to the naked eye, but by the aid of the lens we see that the warts are still present, though much smaller, while the long forked bristles have quite disappeared and have been replaced by very short fine hairs.

The Second Stage is consequently an easy transition to the Third, in which latter the striking markings have completely supplanted the bristles; and there is, therefore, no such sudden change as I had believed to take place in passing from the Second to the Third.

A. GRUBER.

Freiburg, April, 1885.

CURATORSHIP.

Since our note of page 166 was written the American Entomological Society has established a salaried Curatorship, and has elected Mr. S. Frank Aaron to that position.

This Society is now, and is likely to continue to be, in a condition to care for all bequests and loans of books and material. Collectors can make no better disposal of their duplicate material and extra type specimens than to forward them to the Society, Nineteenth and Race Streets, Philadelphia.

As we go to press, we are pained to hear of the death of Mr. Herbert K. Morrison, of Morganton, North Carolina. None of the particulars of what must have been a sudden death have reached us.

Mr. Morrison has long been known as an energetic and panistaking collector, and a student of no mean ability in the *Heterocera*. For the past ten years he has taken extensive trips into unexplored regions; principally along either side of the Rocky Mountains, during which he has done more to advance our knowledge of geographical range, and local variation, and to unearth new species than any collector of his day.

Papilio, Vol. iv, Nos. 5 and 6, was published on July 22, 1884.
Papilio, Vol. iv, Nos. 7 and 8, was published on January 29, 1885.
Papilio, Vol. iv, Nos. 9 and 10, was published on July 13, 1885.

ERRATA.

Page 11, line 7, for *impossible* read *possible*.
" 17, " 1, omit comma after *pinkish spots*.
" 19, " 23, for *osternalis* read *ostreonalis*.
" 21, " 2, after *wings* insert *and*.
" 37, 4th line from bottom, the quotation mark after *other* should be omitted and placed at the end of the last line.
Page 42, line 16, for *Pseudohagia* read *Pseudohazis*.
Pages 72 and 73, for *Vulurraria* read *Vulneraria*.
Page 75, 5th line from bottom, omit comma after *broadly*.
" 82, line 9, omit comma after *Thyridopteryx*.
" 82, " 11, for *Vulgivellus* read *Vulgivagellus*.
" 105, " 7, for *describers* read *describer*.
" 105, " 10, after 100 place comma instead of period.
" 105, " 21, omit *the* after *capture of*.
" 106, last line, for *our* read *one*.
" 118, line 1, for *Arterias* read *Asterias*.
" 122, last line, omit comma after *Reniform*.
" 125, line 1, for *intranervular* read *intronervular*.
" 125, " 5, for *marginal* read *margin*.
" 126, " 9, (and below) for *Crotalaræ* read *Crotalariæ*.
" 146, 4th line from bottom, for *Apatalodes* read *Apatelodes*.
" 152, line 36, for *specimen* read *species*.
" 153, " 1, after *this* insert *is*.
" 154, " 11, the last word should read *oenotherella*.
" 158, " 17, for *absolete* read *obsolete*.
" 167, " 4, the period after *Survey* should be a colon.
" 170, " 24, insert) after *mine*.
" 182, " 15, for *Bosid.* read *Boisd.*
" 182, 3d line from bottom, insert) after *Valley*.

PHILADELPHIA NATURALISTS' AGENCY

For the Purchase and Sale of New and Second-Hand

SCIENTIFIC BOOKS.

No thoughtful observer can fail to notice the enlarged attention everywhere directed to scientific studies and the steadily increasing number of students, especially in the South and West. In recognition of this growth institutions of learning are strengthening the old or endowing new departments of Biology, and adding to their cabinets and libraries, while publishers of scientific books are displaying a corresponding activity.

Good second-hand books find a demand proportionate to the new. Standard works which have gone out of print and which have not been entirely superseded; curious and out of the way books; partly worn but unmutilated copies of approved school and college text-books; works of reference in every department—all these are eagerly sought after. A judicious selection of second-hand books often effects an important saving of expense. We emphasize a *judicious* selection, because many old books, on the other hand, are practically worthless. Old editions of text-books in sciences which have made rapid advances within a recent period, as, for example, Chemistry, Electricity or Photography, are often worse than valueless because they teach exploded theories and obsolete methods. The sage advice, "Prove all things, hold fast that which is good," comes with especial force to the builder up of a scientific library.

To aid in filling the existing demand, and to assist students in their selections, a **Scientific Book Agency** has been established in Philadelphia by CHARLES E. AARON, A. M., formerly Principal and Proprietor of the West Jersey Collegiate Institute at Mount Holly, N. J. With the experience since gained as Cataloguer of an extensive Scientific Book Store, and with large opportunities to purchase at Auction Sales and otherwise, I shall be enabled to offer very desirable bargains. Special attention will be given to the Mailing and Express departments, and **Descriptive Price-Lists** will be issued from time to time, which will be sent to book buyers throughout the country. The descriptions in these lists will be unusually full, and those ordering books sent by mail or express may depend on having the same attention paid to their interests as if making a personal selection. The postage on each book will be mentioned with the description, thus effecting in many instances a saving of time and trouble, both to purchaser and dealer.

I shall not place on my lists works which I cannot recommend as desirable, and in all cases the date of the edition will be given if mentioned by the publisher. Especial care will be exercised to see that books are complete as to contents. None but very rare books will be offered in an imperfect condition and then carefully specified.

THE ONE PRICE SYSTEM will be strictly adhered to, and my figures will be as low as the lowest. New Books also will be offered at great reductions. Inquiries for Books not on my lists, whether Scientific or Miscellaneous, will receive prompt attention. Those who purchase chiefly with reference to certain subjects and localities are requested to advise me as to their specialties.

Every order should be accompanied by the money, except in large orders, when the books will be shipped C. O. D. if preferred, 20 per cent of the amount being sent in advance. Money can be safely remitted by Bank Draft, Postal Money Order or Registered Letter. Amounts under $1 can generally be safely sent in stamps or postal notes.

I refer by permission to the following well-known gentlemen:
Rev. W. P. Breed, D. D., Pres't Presby'n Board of Publi'n, Philadelphia, Pa.
D. P. Forst, Esq., President Mechanics' National Bank, Trenton, N. J.
Rev. H. L. Wayland, D. D., Editor *National Baptist*, Philadelphia, Pa.
Professor Henry A. Green, Brainerd Institute, Chester, S. C.
Eugene M. Aaron, Editor of *Papilio*, Lock Box 916, Philadelphia, Pa.

Address all orders to
CHAS. E. AARON,
4113 Ogden St., Philadelphia, Pa.

South American Lepidoptera.

Wishing to go on a collecting tour to the Amazon's region in South America and not having sufficent funds, I would like to get subscribers for LEPIDOPTERA or COLEOPTERA in equal shares of $15 each. I intend to first go to Para, and after spending a time collecting in that vicinity ascend the Amazon as far as Aquitos, making collections at places on the rever. Address :

FRED. KNAB,
P. O. Box, 249, Chicopee, Mass.

References : His Excellency, GEORGE D. ROBINSON, Governor of Massachusetts; JOSEPH E. CHASE, Holyoke, Mass., by permission.

Lepidoptera for Exchange.

The American Entomological Society has among its collections a considerable quantity of duplicate material, principally among the EXOTIC LEPIDOPTERA, which it wishes to exchange for the rare AMERICAN LEPIDOPTERA.

Collectors wishing to exchange are requested to send their lists to the undersigned, who will furnish full particulars relative to the Society's material.

In no case will the Society make the first shipment.

HENRY SKINNER, M. D., *Curator*,
American Entomological Society,
19th and Race Sts., Phila., Pa.

THE

Butterflies of North America.

By W. H. EDWARDS.

◆

This work, as the successive Parts have appeared, has gained the heartiest praise from naturalists for its scientific fidelity, and from artists for the high degree of skill and taste shown in the illustrations.

Volume I.

The First Volume was completed in 1872. It contains 154 quarto pages, and fifty plates, figured life-size, and colored from nature. It represents new or hitherto unfigured species, and their variations, illustrating both surfaces and both sexes, and, in several cases, the preparatory stages, egg, larva, and chrysalis. A new edition of this Volume is now ready.

The Publishers desire to call attention to the very favorable opinions respecting the execution of the first volume, expressed by leading naturalists and journals:—

From Prof. Louis Agassiz.

"Without knowing more of your doings than appears on the face of your publication, I was so much struck by the beauty and thoroughness of your Lepidoptera that I requested Dr. Hagen to write to you and offer you anything from our collections that might be desirable in the prosecution of your work."

From Charles Darwin.

"Part IX. of your Butterflies is one of the most beautiful works which I have seen. Your careful observations on the dimorphism — or rather trimorphism — of Papilio Ajax strike me as most remarkable and interesting."

From Dr. Hagen, Museum of Comparative Zoölogy, Cambridge, Mass.

"I have before me the first volume of your work. It is, for American Lepidoptera, beyond comparison with any so far published, and it ranges with the most prominent works on this class of insects published outside of America, both in the plates and the text."

From Prof. P. C. Zeller, Stettin, Prussia.

"This work is undoubtedly the best that America has produced hitherto in the cause of Entomology, and equals the very best European works."

From Alfred R. Wallace, Esq.

"Part IX. is an exceedingly interesting number, and goes far, I think, to elucidate one mode, at least, in which species are formed."

From H. W. Bates, Esq.

"Your discoveries regarding Papilio Ajax and Grapta Interrogationis [detailed in Part IX. Vol. I.] are of the greatest interest."

From "Nature," Vol. V., p. 490.

"This number (9th), like its predecessors, is accompanied by many quarto plates in the highest style of pictorial excellence, depicting some extremely beautiful species and varieties of Butterflies."

From "Nature," Vol. VII., p. 412.

"No American work of the kind has ever been printed containing in its pages so satisfactory illustrations of the various species."

From "The Entomologist's Monthly Magazine," London.

"It is not too much to say that the figures will bear comparison with the best that have ever been given in iconographical works. They are correct in outline and drawing, and colored with great truthfulness and sobriety. The letterpress accompaniment to the plates is also remarkably well done."

From the "Canadian Entomologist."

"It would be difficult to produce anything more beautiful or true to nature than these exquisite drawings of Butterflies; they vie in excellence with any European work we have seen."

From the "American Entomologist," B. D. Walsh, Editor.

"The colored plates illustrating these species are unsurpassed in splendor, naturalness of color, and correctness of detail, while the typography and press-work are such that Americans may justly feel proud of the work."

VOLUME II.

The Second Volume or Series was finished in November, 1884. It contains 364 pages, and 51 plates. As in Volume I., the plates have been drawn by Mrs. Mary Peart (formerly Miss Peart), and colored by hand by Mrs. Bowen and Mrs. Leslie. In this Volume the preparatory stages of a large proportion of the species treated of are given in full, after original drawings by Mrs. Peart, and the plates show the complete history from the egg to the chrysalis and butterfly.

The following are a few of the notices of the Parts of the Second Volume: —

From "The Entomologist's Monthly Magazine," London, February, 1878.

"The individual Parts of this work have, so often as they appeared, been alluded to by us in terms of almost unqualified approbation."

From same, February, 1878.

"A further installment of this beautiful work. The lady artist, Mary Peart, who draws the figures, has done her part of the work (as usual) in the most admirable manner; and the way in which the author has treated the purely descriptive and biological matter is, to say the least, exhaustive and masterly."

From same, April, 1879.

"We have frequently, on former occasions, spoken in terms of unqualified praise of preceding Parts of this magnificent work. The Part before us maintains the reputation the author has gained amongst entomologists to its fullest extent. . . . The whole history (of Phyciodes Tharos) is so interesting that short extracts could not do justice to it."

From same, September, 1883.

"A very magnificent Part of this magnificent work. The three exquisite plates illustrate: 1. Three species and varieties of Pieris, and contains about twenty figures; 2. Limenitis Eros, with about twenty-five figures, a pictorial complete life-history; 3. Lemonias Nais and Palmerii, with about thirty figures, also forming life-histories. The details of habits and economy are, as usual, of the fullest possible nature."

From S. H. Scudder, Cambridge, Mass., May 4, 1883.

"Your Part XI. has just come to hand to delight me. I have not yet found time to more than glance at it, but I see at once one thing — that you have filled one of the greatest voids in our knowledge of the biology of butterflies by your studies of Lemonias."

From "Science," May, 1883.

"In the Eleventh Part of his Butterflies of North America, Mr. Edwards furnishes plates of more than usual interest, and of a fidelity to nature which we have come to expect from this source. They have, indeed, never been surpassed, and it would be difficult to point out an error of delineation."

TERMS:

VOLUME I.

Bound in half morocco, 50 colored plates	$35.00
" " " 50 plain plates	20.00
In sheets (unbound), 50 colored plates	30.00
" " 50 plain plates	15.00

(We cannot supply Volume I. in Parts.)

VOLUME II.

Bound in half morocco, 51 colored plates	40.00
" " " 51 plain plates	20.00
In sheets (unbound), 51 colored plates	35.00
" " 51 plain plates	15.00
Parts I. through VII., containing 5 plates each	$3.50 each.
Parts VIII. through XII., containing 3 plates each	2.25 each.
Part XIII., containing 1 plate	1.50.

The Volumes or Parts will be sent by mail, post-paid, on receipt of price.

A very small edition of each volume was printed, and only a few copies remain unsold. Libraries and individuals wishing to secure copies should order at once.

Postal notes and money are at the risk of the sender, and therefore remittances should be made by money-order, draft, or registered letter to

HOUGHTON, MIFFLIN AND COMPANY,
4 PARK STREET, BOSTON, MASS.

Entomological Supplies

ON SALE BY

JOHN AKHURST, 32 Nassau Street, Brooklyn, N. Y.

Improved Entomological Forceps, made of fine spring steel, nickel-plated, 6¼ inches long, price	$1.50
Small Brass pincers, per pair	25
Sheet Cork for Insect Boxes, size 12 x 3½ x ¼, per dozen sheets.	1.25
Entomological Pins, Klaeger and Carlsbader, in packages 500 each, per 1,000	1.25
Assorted sizes, per 1,000	1.50
Insect Net Rings	75
Setting Boards for Lepidoptera, each	25
" Blocks, each	10
Egg Drills, each	.20, .25 and .30

ALSO DEALER IN

NATIVE AND EXOTIC INSECTS.

N. B.—The above prices do not include the cost of transportation. Cash in P. O. Money Order or Registered Letter MUST accompany all orders.

REV. W. J. HOLLAND, Fifth Avenue, Pittsburgh, Pa., solicits correspondence with collectors in all parts of the world, and is prepared to purchase or exchange *Macro- and Micro-lepidoptera*. Is especially desirous of obtaining perfect specimens of the *Sphingidæ* and *Bombycidæ* of North and South America, having in view the preparation of Monographs of these two groups. Special arrangements made with collectors in foreign parts.

LEPIDOPTERA.—*Diurnals* and *Nocturnals*. Orders for Florida Insects will be promptly filled during the coming season at reasonable prices. Address,

WM. WITTFELD,
Georgiana P. O., Florida.

References: E. M. AARON, Phila.; W. H. EDWARDS, Coalburgh, W. Va.

SCIENTIFIC AND MEDICAL BOOKS, Minerals, Shells, Fossils, Birds, Eggs, Insects, etc., for sale by A. E. FOOTE, M.D., Prof. Min. and Chem., Fellow Am. Ass'n Adv. Science, Life Member Am. Museum Nat. History, N. Y., and Philadelphia Academy Nat. Sciences, 1223 Belmont Avenue, Philadelphia. Specimen copy, 32 pages illustrated, NATURALISTS' LEISURE HOUR AND MONTHLY BULLETIN sent free. Over 1000 Entomological books and excerpts in stock.

WANTED.—Good specimens of Lepidoptera of the U. S. to complete my set for the purpose of preparing a Manual of Macro-lepidoptera. Send lists to G. H. FRENCH, Carbondale, Ill.

GROTE'S NEW CHECK LIST OF HETEROCERA can be had of HY. EDWARDS, 185 East 116th Street, New York. Price, $1.00.

We are prepared to furnish Entomologists with supplies of all descriptions at lowest prices.

Write for Catalogue.

NATURALIST'S SUPPLY,
P. O. Box 469, Philada., Pa.

"BULLETIN OF THE BROOKLYN ENTOMOLOGICAL SOCIETY." A monthly journal devoted to Entomology, published by the Brooklyn Entomological Society at Brooklyn, N. Y. Subscription $1.00 per volume. Editor, John B. Smith, 290 3rd Ave., Brooklyn, N. Y.

Also published by the society, a "CHECK-LIST OF THE MACRO-LEPIDOPTERA OF AMERICA NORTH OF MEXICO." Price 25 cents per copy. Address the society at Brooklyn, N. Y., or the editor, as above.

Recently Published, Price 10s. 6d.

INSECT VARIETY.

TREATING OF THE ODORS, DANCES, COLORS AND MUSIC OF INSECTS,

THE BUTTERFLIES
OF
NORTH AMERICA.
BY
W. H. EDWARDS.

HOUGHTON, MIFFLIN & CO., Boston, have issued Part XI, Vol. 2, of this work. Price, $1.50.

Contents:—PIERIS SISYMBRII, larva, etc.; P. BECKERI, larva, etc.; PIERIS NELSONI; LIMENITIS EROS; LEMONIAS NAIS, larva, etc.; L. PALMERII.

After May 1, 1883, the price of Parts I to VII, 5 plates each, will be $3.50 per part; of VIII to XII, $2.25 per part; or 75 cents per plate—to all new subscribers. Price of bound volume, $40.

MONSIEUR ALFRED WAILLY (member Lauréat de la Société Nationale d'Acclimatation de France) formerly at 110 Clapham Road, London, has removed to TUDOR VILLA, TUDOR ROAD, NORBITON, SURREY, ENGLAND, and will be glad to obtain by purchase or exchange, living cocoons and pupæ of American Lepidoptera.

H. RIBBE, Naturalist, Blasewitz, Dresden, Germany, has for sale a large stock of recently collected and well prepared insects, especially Lepidoptera and Coleoptera.

Very fine and beautiful species collected by Mr. Carl Ribbe in the seasons of 1882 and 1883.

An extensive stock of Amphybiæ, Conchyliæ, Birds, etc., etc. Moderate prices, and extra allowance on large orders.

SUBSCRIBERS TO PAPILIO who have not yet sent a remittance for Vol. IV, are requested to do so *promptly*.

EUGENE M. AARON.

HESPERIDÆ WANTED.

The undersigned wishes to correspond with collectors in all parts of the World who have *Hesperidæ* for Sale or Exchange. Many rare North American *Rhopalocera* for exchange.

EUGENE M. AARON,
Lock Box 916,
Philadelphia, Pa.

GODEFROI MOLLINGER, Wageningen, Holland (formerly at Godesberg, Germany), wishes to arrange with collectors for the *purchase or exchange of any number of good pupæ of American Diurnals*. P. Philenor, Turnus, Asterias, Cresphontes, etc. Good pupæ of the following European Lepidoptera can be sent in exchange this winter: P. Podalirius, Alexanor and Machaon; Thais Polyxena and Medesicaste; Anth. Cardamines; Pol. Amphidamas; Lyc. Iolas; Van. Levana; Heter.; Acherontia Atropos; Smer. Ocellata and Populi; Saturnia Spini and Pavonia, and some others.

Also, prepared (blown) larvæ and many first-class specimens of mounted Lepidoptera can be had in exchange for American Diurnal-pupæ.

WANTED.---HEMIPTERA.

The undersigned will be glad to obtain, by purchase or exchange, Hemiptera—Heteroptera from all parts of North America.

Correspondence with careful collectors desired. Address,

S. E. CASSINO,
Peabody, Essex Co., Mass.

A. F. CHATFIELD, Albany, N. Y., desires correspondence with a view to exchanges. North American *Macrolepidoptera* the desiderata.

Wanted. — Diptera (Bibionidæ, Leptidæ, etc.) in exchange for other insects. Collections made in any Order at reasonable rates. Address, D. W. COQUILLETT, Andheim, Los Angelos Co., Cal.

A LIST OF SPECIES OF NORTH AMERICAN BUTTERFLIES has been printed to accompany Vol. 2, Butt. N. A., just completed. Separate copies of this List may be had of Houghton, Mifflin & Co., Cambridge, Mass., or of Wm. H. Edwards, Coalburgh, W. Va.

Price 50 cents.

Entomological printing of every description promptly and *correctly* executed. Reference: PAPILIO and the American Entomological Society of Philadelphia.

Geo. B. CRESSON, 55 N. 7th Street.
Philadelphia, Pa.